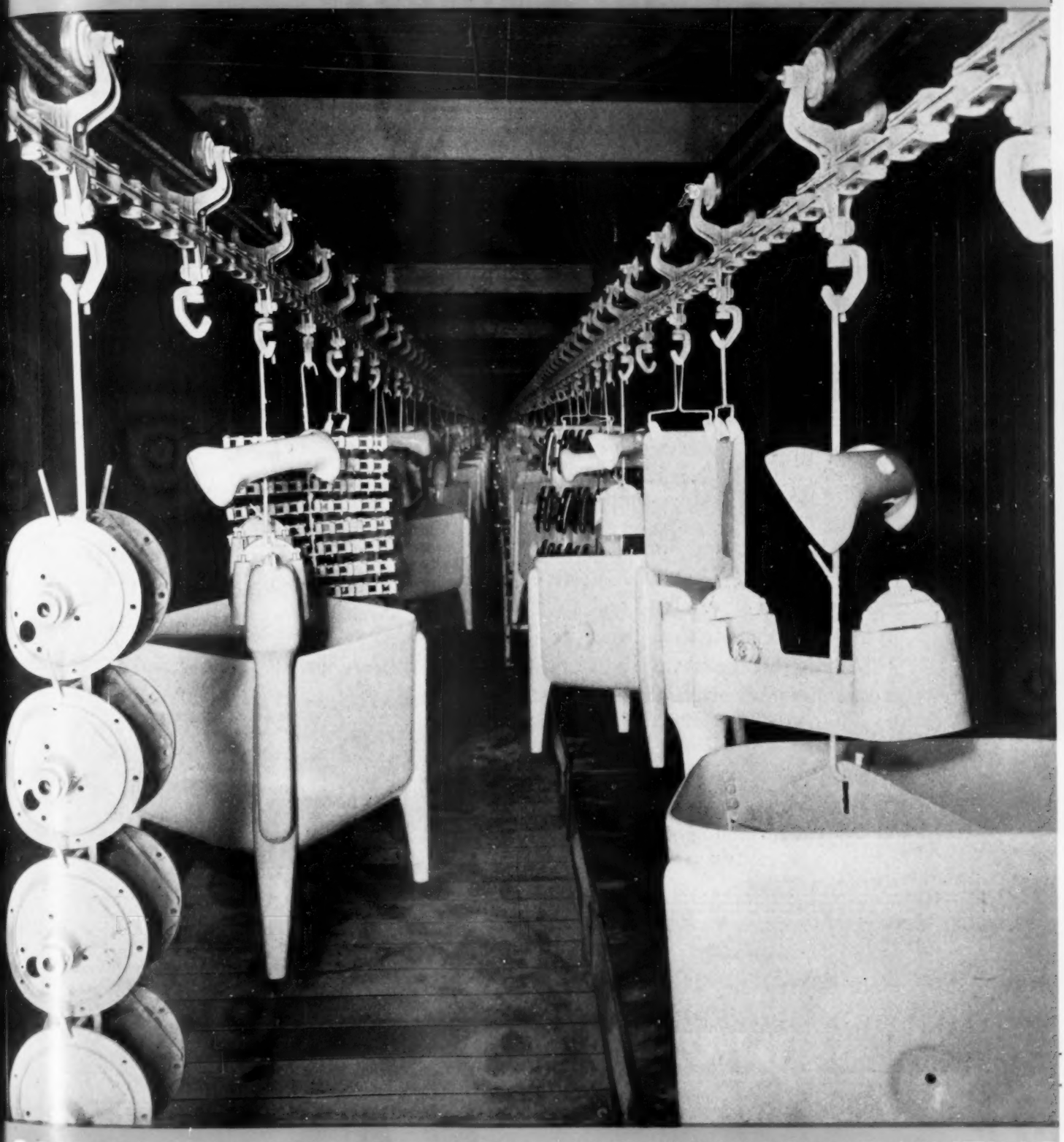
DECEMBER, 1940

ORGANIC FINISHING

SECTION OF METAL FINISHING



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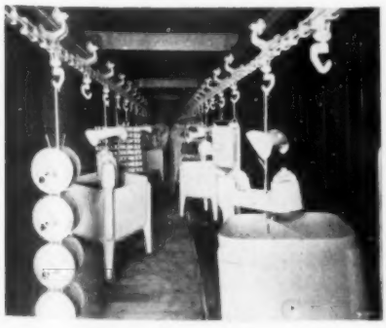


Photograph on Cover

Scene on finishing line for washing machine parts at Maytag Co.
(Courtesy Anderson, Inc., Detroit, Mich.)

Organic Finishes on Plastics

A short time ago, the rapid development of plastics was causing not a little concern in some quarters of the finishing industry. Indeed, it did appear for a while as if a large number of wood and metal products, normally finished with lacquers, enamels and other organic coatings would be replaced by plastics not requiring any organic finish.

Today we know that such concern was without basis. Like many new materials to reach industry, plastics do not find their greatest field in replacing old materials having special and useful characteristics. Rather it is in developing new applications where their particular properties, not found elsewhere, can be used to advantage.

So it is that wood and metal finishing goes on as before. As a matter of fact, rather than reducing the amount of finishing, the advent of plastics has increased it—for two reasons. First, certain results can be obtained only with organic finishes and new finishes for application over plastics are being developed and used. Second, it has been found that a cheap base plastic finished with a colored organic coating is more economical than a straight colored plastic.

No, plastics have not reduced the amount of organic finishing.

L. H. LANGDON, *Publisher* • T. A. TRUMBOUR, *Business Manager* • DR. WALTER R. MEYER, *Editor*

Test for Paint Mold-Resistance

By Alex M. Partansky and Robert R. McPherson

Dow Chemical Company

Condensed from report to the American Chemical Society

The importance of controlling mold growth on painted surfaces has recently attracted the attention of technical men. The paint-mildewing problem is particularly serious in industrial plants where, owing to the nature of the processes involved, high humidity and fairly warm temperatures are maintained. The mold growth not only gives an unsightly appearance to the rooms and injures the paint, but presents a serious danger in contaminating the product.

Mildew troubles have been considerably lessened though not entirely eliminated in paints of high pigment content, particularly zinc oxide, made up with high-grade, rapid-drying spar varnish, which dry to a hard smooth film.

After two years of extensive experimental work on mold-growth prevention, during which upward of 200 commercial paints of various types were tested, the investigators have yet to see a paint that would not mold after seeding by grafting, unless a good preservative had been added.

In the new testing method, the paint is "seeded" by placing a painted surface in contact with an actively growing mold mycelium. When this "grafting" procedure is carried out with due care, the seeding is successful in at least 99 percent of the cases. "Half-and-half" panels are used, paints treated with fungicide being applied to one panel, and the original paint to the other. Both panels are then subjected to the seeding.

By this procedure it usually takes not more than three weeks to obtain the maximum growth, although with exceptionally hard paints a longer time may be required. However, it was found convenient, for the sake of comparison, and since both the rate and the maximum extent of growth are important, always to make readings seven and twenty-one days after seeding.

A very important feature of this laboratory method is that it allows separation of the two factors involved in the molding of the paint panels during field testing:—First, the original effectiveness of the preservative treatment, and second, the effect of weathering and breakdown of the paint film. In other words, by this method the mold-resistant properties of the original paint as well as of the paint films subjected to weathering, both natural and artificial, can be tested at any particular stage of the breakdown.

The grafting method of seeding has also been found applicable for testing the mold-resistance of canvas, awnings, and other materials, and for seeding with molds other than the one recommended for paint-testing. Consistent results could not be obtained by seeding with spores, and that method was finally abandoned in favor of the present "grafting" procedure.

It is generally agreed that under favorable conditions a luxuriant mold growth readily develops on slow-drying long-oil (low in pigment) paints made up with impure oils containing mucilaginous and nitrogenous matter, which on drying give a soft, moisture-containing film.

The new procedure is in contrast to the previous widely used method of field exposure in the Southeast Coastal States, usually Florida. The chief disadvantage of the field test for the preliminary evaluation and comparison of paint preservatives, besides its slowness, is the lack of uniformity in the natural weather conditions, not only throughout the year, but between the same seasons of different years. It is also difficult to compare data obtained in different localities, for there is no such thing as "standard weather." To minimize weather variability and to remove the possibility of misleading results, field tests to be conclusive require repetition for several seasons.

A good laboratory method carried out under standardized conditions has a great advantage over the field exposure method for all preliminary or routine testing. It is not only independent of the season and can be started whenever desired, but since all conditions can be reproduced exactly for every test, results obtained at different times are comparable to each other.

The mold now used in paint testing work by the new method is No. 29, a rapid-growing *Aspergillus* forming dark-brown spores. It was originally isolated two years ago from a molded paint and selected for the paint-testing work from a group of thirty-five molds because of its exceptionally abundant and vigorous growth on oil paints and its high resistance to toxicants. This choice is also supported by the fact that most of the molds reported as growing on oil paints in nature belong primarily to either *Aspergillus* or *Penicillium* genera.

Besides the advantage of standardization of the procedure, the laboratory method of testing mold-resistant properties of paints can be made to include and to intensify the principal factors favoring molding of paints under the conditions of actual service namely, heavy seeding with selected molds found to grow well on paints, high humidity, warmth, and darkness.

Training the Spray Finishing Operator

By W. P. BALDWIN

Organic Finishing Technician
New York

The author recommends practical hints for spray operator training. These include stamina and speed, eyesight, accuracy, timing and body motion control. A suggested standard spraying position is outlined.—Ed.

Today in the field of industrial finishing, increasing attention is being given to the study and application of spraying technique with a resultant increase in production, less costs, and more efficiency. From a recent article[1], I will quote the following which should be kept in mind: First—"It has been estimated that more than fifty per cent of all spraying lacquers and enamels are lost directly, through overspray and indirectly, when more than the minimum film thickness consistent with quality, is applied. The average spraying efficiency is less than fifty per cent; the highest efficiency established to date has been of the order of 60 per cent."

"What does this mean in terms of dollars and cents? It means that, in many cases, but two quarts of each gallon of finishing material purchased, are actually applied and that almost another quart is applied where it is useless for protection or decoration and further, it means that operators are being paid a premium for spraying excess materials." Therefore, our objective in the consideration and application of "spray motion technique" is to increase the average 50 per cent efficiency up to 60 per cent efficiency, which will result, of course, in lower production costs and higher quality finishes.

Selecting the Trainee:

The first and fundamental point to be taken into consideration in the organizing of spray motion technique is to study and know the abilities of your finishing room personnel, then select your man or men to be trained as a spray operator. For example, when a major league baseball rookie reports to the pre-season training camp, he is sized up for his various abilities and spotted in a playing position accordingly. Likewise, when we give consideration to the placement of a man in a production line, we should select that man on a basis of several necessary fundamental characteristics. These characteristics are:

W. P. Baldwin

Stamina and Speed: Production finishing, due to the costs involved, calls for speed and for a man to maintain that speed he must have the necessary stamina to back it up. It is a known fact that when men report to work early in the morning, their spray work is fairly accurate and this accuracy drops toward noontime, picks up at one o'clock and again drops toward the close of the day. Therefore, we should choose men with that extra stamina to back up the necessary speed in minimizing these two weak spots. Of course, all sprayers do not work with the same speed and in this case, we should spot them in the production line so as to produce a well balanced and smooth running system.

Eyesight: A man should have excellent eyesight. Constantly sighting a moving gun is very tiring and laying on different film thicknesses calls for sharp eyesight. "Sharp eyes" for a finish can and should be constantly developed.

Accuracy: The laying of a very definite film thickness consistently throughout the day calls for accuracy. Thus, this characteristic calls for a man who is attentive to his work, and who is not slipshod and careless in the way that he does things. "Study your men's actions!"

Timing and Body Motion Control: In the training of a major league baseball rookie, much importance is given to perfect timing and body coordination. A smart short-stop can pick up on the run, a hard hit ball and in one continuous motion throw that ball to first base to beat out a fast runner by one step. How? By perfect timing and coordinated muscle control! As a matter of fact, every man on the team "gets set". Not only is this true in base ball, but also in other fields of activity. A typist assumes a position before typing and then "beats out a rhythm" on the typewriter. A golfer develops a swing and so on in the many activities of human endeavor.

Approach, poise, perfect ease, timing and coordinated body control are the answers to high degree of perfection. The earmark of a top-hand spray man is that smooth, swinging rhythmic motion which gives one control over the spray gun, and I am firmly convinced that this question of balance and off-balance is one of the major weaknesses of many spray operators.

A sprayer may be spraying and suddenly slow down his stroke, close in

[1] W. G. Sheane, Metal Finishing, *36*, 511 (1938).

on his object and deposit too much paint in one spot. Or he may pull away from the object and dust it! Why? Simply because his motions are not in time and are not coordinated. These faults should be corrected. We must teach him how to swing, shift without losing his balance, and how to time himself.

A Suggested Standard Spraying Position: First we must teach the sprayer to assume a definite flexible working position in line with the object he is to spray.

(1) Approach the object to be sprayed close enough to work in on the object and to pull away from the object.

(2) Line the body with the object to be sprayed. The center of the body will not be in line with the center of the object to be sprayed, but will be off to the left (the operator's) of the object, because his spraying arm is not in the center of his body! To center your body on the object, just raise your arm pointing to the center of the object and this will give you a correct line up. Remember now that we are interested in developing an even swing which will give us an even stroking of the gun. For example, on a panel that is 18" wide, we line up our body so that when we raise our gun up to the panel, it will divide the panel into two equal parts and when we swing from the center point of that panel to either outer edge, the swing will be an even 9" each way!

Now on the other hand, if we line the center of our body with the center of the panel, raise our arm and aim the gun, the swing will go to only one side for the entire panel width of 18". This swing will be one of ½ a cycle and not in perfect balance. Did you ever see an elephant swing? Does he only swing to one side in a half arc or does he make a complete arc with an even body balance?

(3) Having learned to assume our position so as to produce an even and well balanced stroke, we must next learn how to keep our balance on our feet. Standing with the gun aimed at the center of the panel, first close both feet together, then spread them evenly from that center point—far enough apart to give you an even swing in either sidewise direction, but not so far apart as to become flat-footed. Now, from that position, move the left foot backward and the right foot forward—far enough apart in this forward—backward direction so as not to be close together or not so far apart as to be flat-footed. Having assumed this position, a man can swing in any direction and be in perfect balance.

(4) A one-step shift can be made with either foot and in any direction to increase the range, but in doing so, move the foot in line with the motion of the body so as to keep in time with the body movements. Also, pivot on the ball of your foot in doing this shift.

These few fundamental points I am sure will help you to have less trouble with your spray men and as well will give you a better insight as to their troubles in handling a gun.

In conclusion, remember continually that our objective is to raise our spraying efficiency, and that to obtain that increase in efficiency, we must consider and look into spraying technique from every angle. First we must select the right man for the right job and secondly, we must train that man and the first thing to teach him is how to "approach" the object to be sprayed. The second thing to teach him is how to handle a gun. This and other factors will be given consideration in later articles.

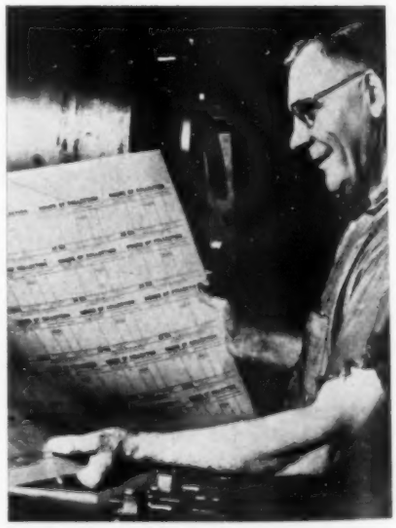
Not only can these points be applied to the training of new spray operators, but to your regular spray operators as well. Know and study the motions of your spray operators, for much can be accomplished by teaching a man how to handle himself. Diplomatically correct these little faults in your men and in time that much desired increase in spraying efficiency will come about!

+ +

Metal Sheets Coated and Lithographed for Various Purposes

Sheets of metal, coated with enamel, are used for making hundreds of thousands of collection time cards for U.S. mail boxes. The metal sheets so treated are then ready to have the time of collection of mail, any design desired or wording lithographed on them, in the manner shown in the illustration. The gallonage and price information seen on the latest gasoline pumps at filling stations, lithographed on metal in a similar manner, are also the product of firms like the Metal Art Litho Corporation, Milwaukee. Metal sheets similarly enameled are also lithographed for use as name plates, clock dials and for many other purposes.

In the picture we see Emil Coesfeld, plant manager of the Art Metal Litho Corporation, examining a series of mail box cards just off the lithographing presses. This is part of an order for 150,000 of these mail box cards, Coesfeld says, and it is claimed that the Art Metal Litho Corp. is one of the few in the middle west doing work of this kind on sheets of enameled metal. After the lithographing has been done, the sheets of metal are varnished and stamped to the desired size, ready to be put into use for which they are intended.



Examining mail box time cards at Art Metal Litho Corp., Milwaukee, Wisc.

Consistency of Organic Finishing Materials

By James R. Lawrence

New York, N. Y.

One of the most important properties of an organic finishing material is its consistency — more popularly known as body. To a large extent, consistency governs such factors as the workability (ease of spraying, brushing, etc.) of a material, its leveling and sagging characteristics, its stability during storage, and the amount of thinner required to reduce the material for application. Consistency tests are performed as routine in the manufacture and application of finishing materials, in the latter case for controlling the amount of reduction for spraying, dipping, brushing, etc. and for checking the uniformity of finishing materials as they are purchased.

Consistency is defined as the resistance of a material to deformation or flow. This resistance may be due to: (1) plasticity, in which case the resistance to deformation or flow is such that the material requires the application of a definite force to overcome the internal friction and make the product flow; or (2) viscosity, in which case, the deformation or flow is directly proportional to the force exerted at all times. The difference between plasticity and viscosity may be illustrated as follows. A heavily pigmented paint placed in a tube drawn to a small orifice may not flow out until some force is applied on the material. Such a material exhibits plasticity. On the other hand, if a clear, homogeneous varnish is placed in the tube it may flow out with no aid until the tube is entirely emptied. This material is one exhibiting viscosity rather than plasticity.

Fig. 1. Saybolt viscometer.
(Courtesy, Fisher Scientific Co.)

Consistency Instruments

The number of instruments for the determination of the flow characteristics of materials is very large. There are literally dozens of them—consistometers, viscometers, plastometers, mobilometers, etc.—each with its special characteristics and advantages. There are, however, relatively few distinct types. Most of the instruments in use in the finishing industry fall into one of the groups described below.

Fig. 2. Zahn cup for rapid viscosity measurements.

Efflux Viscometer. The efflux viscometer, of which there are a great variety, is essentially a cup of definite dimensions fitted with an orifice at its bottom. The cup is filled with the material to be tested and the time necessary for a given volume to flow out at a given temperature, either under its own weight or under pressure, is taken as a measure of consistency. The Saybolt Viscometer and the General Electric Zahn Cup, shown in Figures I and II are two of the most widely used modifications of the efflux type viscometer. The latter instrument is designed to remain in the material being tested at all times, immersed to the top of the cup. When readings are to be made, the cup is withdrawn from the liquid by the handle and the time for the cup to empty is noted. The cup is inexpensive, sturdy and easy to operate and requires a minimum of cleaning.

Other efflux instruments are the Scott viscometer, the Gottsch consistency cone and the Ford, Demler, Westinghouse, Pratt and Lambert, Parlin and A.S.T.M. cups.

Bubble Viscometer. This instrument is particularly adapted to use with clear unpigmented materials. A number of glass tubes of equal length and uniform diameter are filled with a series of materials whose consistency values have been previously determined. A small air space is left in each of the tubes before sealing. The material to be tested is placed in a tube of the same dimensions as the standards, filled to the same level and closed with a removable stopper. When the standard tubes and the test tube

Fig. 3. Gardner viscosity tubes.

have been made to come to the same temperature, the entire group is upended and the rise of the air bubble in the test tube is compared with those in the standard series.

Figure III shows one of the Gardner bubble viscometer series.

Falling Ball Viscometer. The flow characteristics of organic finishing materials may be measured by noting the time required for a heavy metal ball to settle through a definite distance of the material in a vertical glass cylinder. This principal is best applied to clear materials through which the progress of the ball can be seen. However, it may be used with opaque materials by using suitably arranged electric contacts.

Torsion Viscometer. Instruments of this type operate in a manner similar to a painter stirring with a paddle. A cylinder or paddle is made to rotate in the material being tested by a falling weight. The time taken for a given number of revolutions of the cylinder or paddle is taken as a measure of the viscosity. In some modifications of the torsion type apparatus, notably the MacMichael instrument, the cup containing the material is rotated and the degree to which the cylinder in the cup is turned denotes the viscosity. Torsion type viscometers include the Stormer (Figure IV), the Doolittle, the Kampf, the Wolfe-Hoepke, the DeVilbiss and the Brookfield.

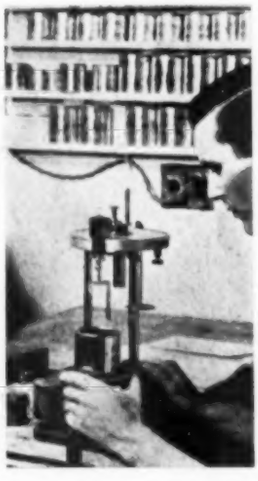


Fig. 4. Stormer viscometer.

Capillary Viscometer. The capillary viscometer, as the name suggests, is essentially a glass tube of small diameter which is made to fill with the material to be tested either under the weight of the material or by the action of a vacuum applied at the discharge end of the tube. The time required for the material being tested to reach definite positions along the tube is noted and compared with similar data on known materials.

Penetrometer. Penetrometer type apparatus consist of a weighted plunger which is made to force its way into a cylinder of the material being tested. The weighting may be varied as required by different materials. The time required to penetrate the column is noted as a measure of flow characteristics.

The Gardener mobilometer is one of the most widely used penetrometers. This instrument, illustrated in Figure V, is fitted with a perforated plate plunger.

Controlling Consistency In Application

It was pointed out previously that one of the uses of consistency apparatus was in controlling the thinning of organic finishing materials for application. Most finishing materials are not in the ready-to-apply condition as they are purchased but are of quite heavy body* and require thinning with volatile solvents before being used.

To secure uniform results during the application of finishing materials it is necessary that the same conditions prevail at all times. This is particularly so with regard to consistency. Once the proper mixture is obtained it should be duplicated thereafter. A material which is thinned too much will tend to sag and produce films of insufficient thickness. Heavy materials may not flow to a smooth film and many times cause difficulties in drying.

There are three methods of controlling the thinning of finishing materials, namely, by volume, by specific gravity and by consistency. Controlling by volume possesses a number of disadvantages. In the first place, no account is taken of the effect of temperature. A mixture of, say, equal parts of a lacquer and a lacquer thinner may work well during the warm months of the year, but the same mixture would probably be too heavy to apply easily during cold periods. Of course, different thinning ratios could be determined for various temperatures but this would require a considerable amount of work. In addition to all this, if thinning is done by volume there is no easy method of determining how much thinner should be added to an already thinned mixture which has lost parts of its solvent content by evaporation, as in a dip tank. Additions of thinner to compensate for the loss must be made by a tedious series of trial and error.

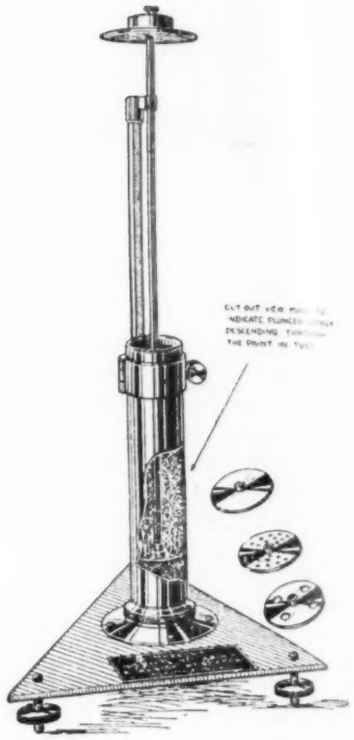


Fig. 5. Gardner mobilometer.

Control of thinning of materials by specific gravity also has certain disadvantages. Chief among these is the fact that many thinners and finishing materials have specific gravity values very close to each other. As a consequence, there can be considerable variation in solvent content and consistency without it being apparent when specific gravity determinations are made. Furthermore, while there is a small effect by temperature on

*Organic finishing materials are sold unthinned for reasons of cost, to minimize settling out of the pigments, and to allow for consistency adjustment with solvents to suit individual requirements.

specific gravity, there is a much larger effect on consistency and these two effects have no particular relationship to each other.

It is obvious that the most nearly perfect control is through the use of consistency determinations, using one of the instruments described above. No measurements of volume of thinner or finishing material is necessary. Replacement of evaporated solvent is made simply by adding solvent until the desired consistency is obtained. Specific gravity, except in a relative way, need not be considered. The effects of temperature changes can be easily observed and corrections in the amount of thinner quickly made.

Shop Problems

Lifting of Finish

Question. We have a number of small cast iron parts now finished with a grey oil paint which we would like to do over in various colored air-drying lacquers. We have found, however, that shortly after the lacquers are sprayed over the grey finish, the whole surface shows bubbles, some of them quite large, and the finish is ruined for our purposes. Can you tell us how this bubbling condition may be stopped? We have tried stripping off the paint but to do this means considerable effort in refilling, sanding, etc. the castings before lacquering.

Answer. To prevent the lifting of the paint which you describe, it is necessary to interpose a film of some material to seal off the paint from the action of the solvents present in the lacquers. You might try applying a thin coating of a good shellac varnish, allowing this to dry and harden thoroughly before spraying the lacquer.

Aluminum Finish

Question. Will you please give the details of the procedure for finishing steel to simulate aluminum? We have tried spraying aluminum finishes, both air drying and baking, and the results have not been exactly what is desired. The process, we believe, is called burnishing and dry aluminum powder is used.

Answer. Steel, other metals and even wood if it is made smooth and non-absorbent, can be made to look like aluminum by applying a coat of clear vehicle to the work, dusting on a very fine grade of aluminum powder and polishing.

The vehicle is applied and on becoming tacky to the touch, extra fine lining aluminum powder is lightly and uniformly sprinkled over it, preferably from a small container provided with an opening covered with cheesecloth reinforced underneath with wire mesh. After the coating has become completely dry, the excess powder is removed with a clean, dry brush having soft bristles and the work is then polished to the desired appearance with a soft cloth. Finally, to prevent the aluminum from being rubbed off or marred, a very thin coat of clear vehicle is applied.

Hints on Metal Finishing

By E. M. STEPHENSON

Finishing Material Strainer

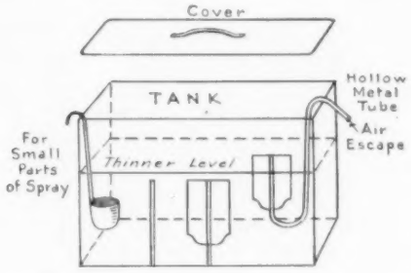
The best strainer I ever came across was made as follows:

Two old-fashioned wash boilers were used and the bottom of one of them was removed. A lip was soldered on the one which had the bottom removed, and a piece of cheesecloth was placed over the bottom boiler, and then the other boiler with the bottom removed, was placed on top—thus leaving the cheesecloth in between to act as a strainer.

The material is poured in the upper can, and after placing on the cover, the material can be left to strain all night.

Cleaning Spray Gun Parts

The cleaning chamber illustrated has been used by the writer for cleaning of spray guns and small parts. If a hollow metal tube hook is used to lower the spray cup so that it rests on a rod beneath the level of the thinner, the spray cup will remain upside down because the hollow tube will allow the air to escape, and thus the thinner will fill the cup. Because of the inverted position of the cup, all of



the finishing material dissolved by the thinner, will fall to the bottom both from the inside and the outside of the cup.

A small metal mesh basket is also handy for holding small parts of the spray gun. The method saves hands and cleaning thinner.

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and Allied Steel Office Units

PART II

By Frank V. Faulhaber

Brooklyn, N. Y.

This article continues the discussion of the finishing of office equipment, the first part of which appeared in the November Organic Finishing section of Metal Finishing.

A turn table should be provided for the purpose, whereon to lay the office furniture units. This is in the spray booth. The turn table permits convenient manipulation of the units, so that all parts can be covered thoroughly, innerly as well as outside. The inside first is overlayed by spray gun, then the outside; each side the top and bottom being gone over four times, preferably twice horizontally and twice vertically, ensuring a thorough, uniform first coat. Each spray operator has his own individual pet methods, but if he is systematic and efficient he can accomplish an exemplary job in a minimum amount of time.

Incidentally, in a modern type of oven heated by an outside atmospheric air heater, a blower forces heated air through ducts from where it is transmitted uniformly to all parts of the oven. Together with recirculating ducts, this system of heating ensures recurring air changes, adequate dilution of oven atmosphere, and baking in the fastest possible time. This oven has automatic atmospheric control and the heater has automatic ignition and gas valves, and also safety devices for temperature control and maximum of operating function. Here, too, a motor driven exhaust fan pulls away enamel vapors from the freshly finished units before attaining the higher oven temperatures. Thus also volatile vapors are removed, whereas otherwise these might discolor the work or even add to the necessary baking time.

In Smaller Plants

Where the filing cabinets receive a prime coat by spray, especially in the smaller plants where smaller ovens are in operation, and much of the work is done by hand, the work is now sent to the baking ovens. The coated parts are suspended by wires, to insure proper circulation, and as soon as the ovens are filled, the doors are closed and the heat is turned on. Here again it is a matter of individual preference and character of work, some plants favoring a higher heat at a shorter time range. One shop likes 275° F. at from 2 to 2½ hours for this prime coat.

In all instances the ovens preferably should be of the type furnishing a uniform temperature both at the top and the bottom so as to obtain an even, uniform bake. This depends upon the arrangement of the burners or heating elements. When this detail is overlooked, the top portion of the filing cabinet would receive an overplus of heat, whereas the base and lower part would receive an undersupply. In such case, the finish would tend to become tacky and off color, and this would be all the more an important factor in the lighter colored finished work.

At this point, whether the work has been dipped or sprayed, and now has a prime coat, thoroughly dry, another vital detail enters. Objectifying for a superior, high-grade finish, the prime-coated cabinets should now receive a light hand sanding, to remove any unevenness in the finish occasioned by dirt or other foreign matter from the air or while finishing. This procedure is doubly important; aside from eliminating manufacturing flaws that may be present, it also provides a finer surface for the succeeding coat or coats.

Some shops may neglect this essential angle, notably so where the cheaper run of office furniture is the output, but it is sometimes even skipped in the plants priding themselves on their top-notch products. Assuredly this slight matter is not so slight after all. It is desirable not only to sand finely this prime coat, but to remove all traces of dust before proceeding with the next coat.

After Inspection

After passing inspection, the filing cabinets are now ready for the final coat, or intermediate applications of finish when such are necessary, as by the nature of the finishes, buyers' requirements, or shop specifications. Most of the office furniture nowadays, what with the advances achieved in recent years along finishing lines, is processed with two coats, and when the right materials and methods have been employed, throughout, the output represents uniformly high-grade workmanship.

Assuming a final or finish coat is now to be applied, in enamel, this is applied by spray, similarly as the prime coat would be sprayed. Some plants allow the same oven temperature and time for heating of this top coat as for the prime coat; some run a lower temperature, allowing the same time; as, for instance, approximately 450° F. at about 40 minutes for the prime overlay, and about 325 or 350° F. for the final finish.

This relates to the usual standard finishes, the various greens, brown, blue, gray, in hard-baked lustrous enamels. The question of color in the finish has also a bearing on the oven temperature operating range. The lighter colored work entails more care in operation, as defects are so much more discernible. Flaws, unpardonable though these may be, are sometimes passed in darker colored work that you could not countenance in brighter, light finishes. In the light

finish - it is always important not to overbake.

In those plants where the output is large and varied, the individual spray operators are each confined to the same colored finishes, each spray booth turning out a certain type of work. Wherever feasible the oven temperature and time range is similarly systematically arranged for the different kinds of work, exclusively.

Faster Baking

In recent years faster methods of oven baking of finishes have been practiced, large plant managements striving always to process a larger output. The many new fast-baking finishes constantly being originated enable finishing operators to put through uniformly high-grade finishes, systematically, at shorter baking intervals. This is especially important where large-scale plants have installed the most efficient and most comprehensive equipment.

The drawers of the filing cabinets receiving an ordinary standard finish are processed similar to the main bodies of the cabinets, aside from the fact that they usually receive a dip coat for the primer, finishing off with the usual spray coat. The dip coat is given by way of the conveyor oven when such method of heating is used. This work is thus facilitated, the pieces being automatically dipped and baked as they gradually proceed through the oven racked on the overhead monorail conveyor, or other types of line conveyors.

Following the final coat baked on the cabinets and the drawers, the work is ready for the rubbing department where it is rubbed with powdered pumice stone and water. The rubbing operation results in bringing out a smooth, satiny finish. The work is then washed, cleaned and then transferred to the assembly room, where it also undergoes a thorough, complete last inspection. In some plants this matter of inspection is rigid, there being another critical surveyal of the work after the assembled cabinets have been provided with pulls and other incidental fittings.

However, at this point let us consider that part of metal office furniture where the management strives for exemplary execution of finishes in grain effects. This is an important phase of operations, assuredly, if the product is to stand out by its graining. In some plants only a small portion of the output is grained, and most of this is done by transfer process. There are still some factories, however, where the management prides itself in the unique, superb wood grain effects it produces by hand. This calls for superior workmanship on the part of real artisans who, somehow, have an inherent faculty for this peculiar art.

The Grainer Artisans

When we bear in mind the fact that individuals have individual ideas, we can readily sense that there is practically no limitation of varied, pleasing, distinctive effects on the part of these grainer artisans. Some grainer experts imbue their artistry with such an originality that others cannot hope to touch it. There are free-lancers specializing in this grain work, wending their ways from shop to shop, taking care of the needs of those plants without a capable grainer or where the grained output is limited or but occasional. Oftentimes the skilled craftsman here has on his lists a line of eager, pressing customers who regularly keep him migrating from place to place.

Some of these men also undertake to care for the requirements of those manufacturers who want their grained output processed by transfer methods. Here, too, the variety of effects is governed in part by the number of transfer plates and other incidental equipment the grainer has available.

(To be continued in January issue)

When specifications for finishes are being considered it is good to know that there is a yard stick available for use in comparing and measuring various brands and types of finishing materials under consideration. Egyptian Finishes have been used as a yard stick for over a half century. It is quite usual to read in a set of specificiations . . . "Egyptian or its equal."

Lacquers, synthetics and novelties as well as special finishes for individual requirements are available to the manufacturer of all types of industrial products. These finishing materials are supplied for spray, dip or brush application and are formulated for air-dry or high or low-bake.

The next time you are in the market for finishes we would appreciate an opportunity of discussing your requirements with you through one of our technical representatives.

A request for such an interview will bring our representative promptly and naturally places you under no obligation.

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ROCKEFELLER CENTER NEW YORK

EGYPTIAN FINISHES

EGYPTIAN Superior FINISHES

ORGANIC FINISHING DIGEST

PATENT AND LITERATURE REVIEWS

Solvents. F. W. Clark., J. Oil Col. Chem. Assoc. 23, 79-88 (1940). A historical review of the solvent manufacturing industry.

Physical Properties and Chemical Constitution of Solvents. V. Alkyl ketones. D. M. Cowan, G. H. Jeffery and A. I. Vogel., J. Chem. Soc, 171-6 (1940). This is original research on the physical properties of solvents. Measurements are made of the index of refraction, surface tension, etc. of 11 alkyl ketones.

Physical Properties of the Ternary System —Butyl Alcohol, Ethyl Acetate and Toluene. E. E. Litkenhaus, J. D. Van Arsdale and I. W. Hutchison Jr., J. Phys. Chem. 44, 377-87 (1940). The writers have performed original research on the above-mentioned system. They have determined the physical properties of the system such as density, viscosity, surface tension, boiling point and so forth.

Artificial Acid Hardened Resins for Lacquers. A. Greth, Angew. Chem. 52, 663-6 (1939). The hardening of lacquers by the action of acids at room temperature is advantageous when the coated object is fixed and cannot be removed.

Preparation of Drying Oils. Dale V. Stingley. Ind. & Eng. Chem. *32*, 1217-1220 (1940). America's dependence on foreign sources for its drying oils is a pressing subject at the moment. Consideration must be given to the practical possibilities of utilizing American semi-drying oils as raw materials for chemical conversion into new types of drying oils. By employing a fractional distillation process, new and valuable types of drying oils can be produced. Marine and soy bean oils are suitable as raw material for this process. Numerous field and laboratory data are given.

Synthetic Resins in Corrosion Resistant Paints. R. J. Moore. Modern Plastics. *17*, 62-4, 96, 98, 100 (1940). The writer discusses generally paints made of bakelite types of resins, i.e., phenol formaldehyde condensation products, and considers the following points: resistance to chemical attack, flexibility retention, water resistance, durability and drying period time. The writer quotes specifications requiring the use of 100% phenolic resin paints.

New Uses for the Recording Spectrophotometer. E. W. McMullen and F. J. Ritchie. Paint, Oil, Chem. Rev. *101*, 10-11, 61-2 (1939). Describes the applications of the recording spectrophotometer to paint technology. The instrument makes it possible to determine accurately the hiding power of paint films. Preliminary experiments have demonstrated that the hiding power of a paint film depends on several factors, among which are: (1) The thickness of the paint film, (2) the number of coats used to make up a film of a given thickness, (3) the concentration of the pigment in the paint vehicle, (4) the wave length of light used for making the test.

Some Suggestions for Research on Dryers. W. Krumbhaur. Paint Tech. *5*, 111-12 (1940). The author discusses some possible fields of research in connection with paint dryers.

Colored Synthetic Resin Coatings on Metals Such as Tanks, Drums and Spinning Buckets. U. S. Patent 2,198,939. April 1940. Granted to C. H. Hempel. Patent divulges a method for forming smooth, impermeable and corrosion resistant coatings on metal articles which consists of applying to at least one surface of the metal, a solution of potentially reactive oil-free phenol formaldehyde resin containing 10-45% by volume of resin of an inert, inorganic, nonfibrous, suspensible pigment suspended within the mix; drying and baking the coating to leave it potentially reactive but inert to solvents during a subsequent dipping or spraying treatment.

Some Wetting Properties of Simple Nitrocellulose Media. E. H. Davies. Oil Colour Trades J. *97*, 1099-1105 (1940). The writer considers the fundamentals of the wetting of a solid by a liquid. He describes a simple, rapid and efficient method for determining the wetting characteristics of a given liquid with a given solid by measuring the angle of contact between them. The method consists of preparing a solid block of the pigment in question and microscopically measuring the angle of contact between the block and a small drop of the cellulose solution placed on the surface of the block. The writer draws, as a result of his experiments, the following conclusions: (1) It is impossible to forecast the wetting action of any liquid mixture to any solid from previous knowledge of the behavior of the liquid with other solids; (2) Butyl acetate in conjunction with butyl alcohol is an excellent material for the pigment used; (3) The addition of hydrocarbons to the solvents does not materially assist in improving the wetting characteristics but ethyl acetate-naphtha blends are superior to or better than ethyl acetate alone; (4) As regards speed of sedimentation, the addition of various liquids to the solvents has little effect—the predominating characteristics of the solvent are maintained throughout; (5) The angle of contact results show that solvents such as "Cellosolve" and "Sextone B" generally wet more rapidly than other liquids examined; (6) The plasticizers examined by the writer may be definitely regarded as non-wetting agents with the exception of blown castor oil which shows a slight effect in this connection.

Gelation of Tung Oil, Part 4. Effects of Several Organic Substances. M. Tatimori. J. Soc. Chem. Ind. Japan. *43*, 102-04 (1940). The writer finds that in the class of neutral substances and compounds such as hydrocarbons (waxes), butyl stearate, tritolylphosphate, alpha naphtheylamine, etc., little or weak retarding actions are observed on the gelation rate of tung oil.

Measurement of Solvent Power by Determination of the Velocity of Solution. B. M. Bare, Jr. and H. H. Nelson. Paint, Oil & Chem. Rev. *101*, 7-8 (1939). To determine the velocity of solution, a device has been made which has the following specifications: It consists of a cylindrical brass weight 2.5" long, 1.5" in diameter with a 0.25" bore thruout the main axis and with a recess which is machined to be 0.25" deep in one head in such a way as to leave a circular wall 0.018" thick. To make the determination of the velocity of solution, 2 felt disks 0.25" thick are compressed into the recessed head and the instrument is placed upright on a nitrocellulose film 0.005" thick that is tacked to a wooden frame. The solvent sample is pipetted into the axial bore. The time elapsing between the appearance of saturation of the felt (edge effect) and the weight falling through the film or toppling over is longer the poorer the ability of the solvent to bring the nitrocellulose film into solution. The writer finds that the ability of a solvent to tolerate dilution of its solutions does not run parallel with the speed of dissolving nitrocellulose. Increasing speed of solution was observed in the following order: Iso-butyl propionate, secondary butyl acetate, cellosolve, isopropyl acetate, ethyl acetate and the group including acetone, methyl ethyl ketone, iso-butyl methyl ketone.

A Method for Evaluation of the Degree of Polymerization of Stand Oil. T. McQuillan and F. N. Woodward. J. Oil & Col. Chem. Assoc. *23*, 8-9 (1940). A new apparatus is described for evaluation of the degree of polymerization of stand oil. It is made of glass and functions in somewhat the same manner as a Soxhlet extractor. The oil sample is placed at the bottom of a large test tube fitted with a syphon which is sealed through the wall of the tube and whose inner arm turns upward above the oil sample to avoid entraining the latter.

Solvents In Industry

Ethylene Dichloride

(1,2-dichlorethane; glycol dichloride; dutch liquid; symmetrical dichlorethane; elaylchloride)

Physical Properties

Ethylene dichloride is a water-white organic liquid possessing an odor similar to that of chloroform. It is one of the most stable of the various chlorinated hydrocarbons, being quite stable to both oxidation by air and hydrolysis by water. Its chemical formula is CH_2ClCH_2Cl and its molecular weight is 98.95.

With most of the common organic solvents, including alcohols, ketones, esters, hydrocarbons, etc., ethylene dichloride is miscible in all proportions. It is an exceedingly good solvent for a wide variety of waxes, fats, oils, gums and resins, both synthetic and natural. Ethylene dichloride alone is not a solvent for cellulose nitrate or cellulose acetate. However, it readily dissolves these materials when mixed with ethyl alcohol.

Ethylene dichloride is listed as having a ble in water. The pure material is soluble in water only to 0.87 per cent by weight at 20° C. and water is soluble in it, at the same temperature, to a maximum of 0.16 per cent by weight. A constant boiling mixture with water is possible, containing approximately 8.2 per cent by weight of water and boiling at 70.5° C. Ethylene dichloride also forms constant boiling mixtures with methyl alcohol, with ethyl alcohol and with a combination of water and ethyl alcohol.

Ethylene dichloride is listed as having a boiling point of 83.5° C. at 760 mm. mercury pressure and a melting point of -35.3° C. Its density at 20° C., referred to water at the same temperature is 1.256, that is, it weighs approximately 10.45 pounds per gallon at 20° C. Its evaporation rate is intermediate between that of benzol and ethyl acetate and its vapor pressure varies between 60 and 1,000 mm. of mercury at 20° C. and 100° C. respectively.

Although it will burn, it does so only with difficulty. Its flash point (A. S. T. M. Open Cup) is 70° F., its apparent ignition temperature in air is 840° F. and its explosive limits in air are 6.2 to 15.9 per cent by volume.

Chemical Properties

The chemical reactions of ethylene dichloride, which are characteristic of the chlorinated hydrocarbons, allow the synthesis of many valuable and interesting compounds. For example, reactions involving ethylene dichloride, sodium cyanide and hydrochloric acid yield succinic acid, once obtained by the distillation of amber. Ethylene dichloride with ammonia forms ethylene diamine and with sodium acetate forms glycol diacetate. Benzaldehyde, dibenzyl, benzoic acid and other compounds may be synthesized using ethylene dichloride.

Physiological Properties

The toxicity of the vapors of ethylene dichloride is comparable with those of gasoline and chloroform. When used in open vessels adequate provisions for ventilation or exhaustion of the fumes should be made. Like most organic solvents, it removes the natural oils from the skin when in contact with it and may produce dryness and cracking.

Uses

Ethylene dichloride finds many and various applications, both industrial and domestic. Because of its strong solvent action on many substances, it is useful in the vapor phase degreasing of metal parts prior to plating and finishing. In the textile industry it is used as a spotting agent, in the cleaning of woolens previous to dyeing and as a constituent of wetting compounds to assist in the degumming of silk and cotton because of its solvency for natural waxes.

In the extraction of oils, fats, etc. on an industrial scale, its sharp and constant boiling point simplifies its removal from the extracted materials and facilitates its recovery. Furthermore, its boiling point is such that low pressure equipment may be used at ordinary temperatures.

As pointed out above, ethylene dichloride is not a solvent for nitrocellulose or cellulose acetate, but requires the presence of ethyl alcohol. For certain purposes such a combination will be found to be quite economical. When used in lacquers, its presence exerts no deleterious effects on other constituents, even after storage for long periods of time.

In combination with carbon tetrachloride, it is useful as an industrial and household fumigant because of its penetrating power and good volatility. It is used to some extent as a constituent of household spray for killing bedbugs, roaches, etc. but care must be taken that it does not come in contact with paints or varnishes because of its action as a paint remover.

Ethylene dichloride is also used as a constituent of soaps, cleaning and scouring compounds, assisting in the removal of greases and increasing detergent power.

Solubility Table

Castor Oil	Soluble
Linseed Oil	Soluble
Cottonseed Oil	Soluble
Mineral Oil	Soluble
Paraffin	Soluble (hot)
Carnauba Wax	Partly Soluble (hot)
Beeswax	Soluble (hot)
Cumar	Soluble
Manila	Soluble
Rosin	Soluble
Ester Gum	Soluble
Copal	Soluble
Dammar	Soluble
Congo	Partly Soluble (hot)
Kauri	Partly Soluble (hot)
Sandarac	Slightly Soluble (hot)
Pontianac	Partly Soluble (hot)
Orange Shellac	Slightly Soluble (hot)
Camphor	Soluble

Specifications

The following are data on one grade of commercially available ethylene dichloride:

Purity	Not less than 99.0%
Water	Not more than 0.01%
Non-volatile Matter	Not more than 0.001 gm./100 cc.
Acidity	Not more than 0.001% calculated as HCl
Color (500 mm. tube)	Not more than 1.0 yellow
Specific Gravity	1.2550 to 1.2570 at 20/20° C.
Weight per Gallon	10.44 to 10.46 lbs. at 20° C.
Boiling Range	Below 82.5° C.—none
	Above 84.0° C.—none

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LATEST COMMERCIAL DEVELOPMENTS IN ORGANIC FINISHING

New Aluminum Finishes

The Stanley Chemical Co., East Berlin, Conn., have announced the development of two new aluminum synthetic finishes. These materials have been produced after months of laboratory and production tests. They are known as "66H-1307 Aluminum Baking Synthetic" and "66H-1515 Aluminum Air-Drying Synthetic" which are said to produce coatings closely resembling dull chrome plated finishes.

They are claimed to be extremely durable, to have excellent adhesion and wear resisting qualities, and to be so smooth as to give the appearance of a continuous sheet of aluminum.

According to the manufacturers, the materials retain their original color on long standing, in addition to their leafing properties, and being non-settling, only a normal stirring is required before use.

While both materials are intended for spray application, No. 66H-1307 baking synthetic is said to have good flow and dipping qualities which leave the surface free from sags, runs or drips. This coating should be baked for 45 minutes at 325°F.

Chemical Resistant Floor Finish

Flexrock Company, 2300 Manning Street, Philadelphia, Pa., have announced an improvement in their acid proof, alkaline proof, fire resistant floor finish, called "Glasflex", which was formerly only resistant to mineral acids and to heat.

The former material was affected by extreme alkalinity and acid conditions, but the new product is said to be improved to a point where a dried film removed from tin and placed in acid and then in alkali in a test tube is not affected.

Some of the tests given the new coating, after it had been dried, on tin, were:

1. Submersion in concentrated sulfuric acid.
2. Submersion in 50% solution sulfuric acid and water.
3. Submersion in carbolic acid.
4. Submersion in total alkalinity (sodium hydroxide).
5. A coat of this material after drying, but without being removed by baking, received a spillage of alcohol. The alcohol was ignited and permitted to burn out completely.

According to the manufacturer, the coating in the above tests was not disturbed in any of the cases.

Further information about this material which is adaptable to both wood and concrete floors, table tops, counters and other such places, can be obtained by writing to the company.

Electric Turntable

General Die & Stamping Corp., 265 Canal St., New York City, are offering to the finishing industry, low-priced turntables.

This turntable called "Roto-Sho" is made entirely of 16 gauge steel and is said to handle a 150-lb. balanced load or a 200-lb. centered load.

The standard table is 16", although extra steel turntables of 8", 11¼" and 18" are available. Overall height is 5¼".

New Low Cost Inorganic Finish

The Porcelain Enamel & Mfg. Co., Baltimore, Md., have announced a new low cost inorganic finish called "Pyroflex", which is said to withstand heat and hard use and does not require metal bonding treatment. This material is available in a wide range of colors, effects, and graining finishes, and is stated to reduce burning temperatures 200°, thus saving on fuel and increasing production.

Some of the other features claimed for this material are its increased resistance to acid over paints and synthetic enamels, high wear resistance, flexibility and its application by dipping instead of spraying.

Manufacturers' Literature

Air-Motored Agitators. The Eclipse Air Brush Co., Inc., 390 Park Ave., Newark, N. J., have just issued a 4-page folder showing the various types and sizes available in the company's line of air-motored agitators. These mixers are explosion-proof, splash-proof and have variable speeds from 30 to 6000 RPM.

Industrial Finishes. Maas & Waldstein Co., Newark, N. J., have recently issued a folder giving color panels of the company's various industrial enamels for application to metal, wood, plastics, leather, etc. The finishes include air drying and baking synthetics, air drying lacquers and special finishes, such as hammertone, wrinkle and transparent color finishes.

Primer. American Chemical Paint Co., Ambler, Pa., have issued a 4-page folder entitled, "Elastic Primer", which is a material for applying to iron or steel. It is said to keep out moisture and to inhibit electrochemical action that may take place on the surface of the steel, leading to rust. The presence of this rust inhibitor is stated to make the material unusually effective on shipbottoms in salt water, as well as on structural steel subjected to acid fumes. Material is also claimed to remain elastic and to contract with the metal under varying temperatures. Material is furnished in red and black for brushing, dipping or spraying.

Ovens. Despatch Oven Co., Minneapolis, Minn., have issued a 6-page bulletin, their bulletin No. 51 describing finishing, baking and drying ovens which have been used for drying synthetic enamels, lacquers, varnishes, paints, etc. Heaters for ovens are described and illustrated, and typical installations of the company's ovens are pictured. Data are given in oven capacities.

Ferro Enamel Corporation Celebrates 20th Anniversary

Ferro Enamel Corp., Cleveland, Ohio, manufacturers of inorganic and organic finishes, colors, porcelain enameling furnaces, ovens and allied products, have announced their 20th anniversary through a leaflet. Pictures illustrate the company's development and progress.

Products Showing Newest Finishes to be Displayed by Maas & Waldstein Co.

An exhibit of products of every description finished with newest organic finishes by latest processes will be held at the offices of Maas & Waldstein Company, makers of industrial finishes, 438 Riverside Avenue, Newark, N. J.

The exhibit will be open on week days, from 9:30 A.M. to 5 P.M., from January 5th through January 30th, 1941.

Types of finishes to be exhibited include: clear lacquers, lacquer-enamels, air-drying and baking synthetic; also wrinkle enamels. They will be exhibited on many products, all of which have been finished under regular production conditions and will exemplify methods of obtaining various finishing results and of adapting finishing schedules to production programs.

Quick drying and baking finishes of great durability and protective quality will be featured. All types of finishes that can be effectively baked by the new infra-red radiant process will also be exhibited.

Admission cards can be obtained on written request to the Maas & Waldstein Company.

American Air Filter Not Sold

The American Air Filter Company announces that Trade and Newspaper notices of its purchase by a large electrical manufacturing company were premature. Negotiations which never advanced beyond the preliminary stage, have been definitely abandoned by mutual consent of both companies. There has been no change in ownership, management or field representation of the American Air Filter Company, which will continue to function as an entirely independent organization.

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SOLVENTS IN INDUSTRY

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Ethyl Acetate 245
Ethylene Dichloride 685
Isopropyl Acetate 627
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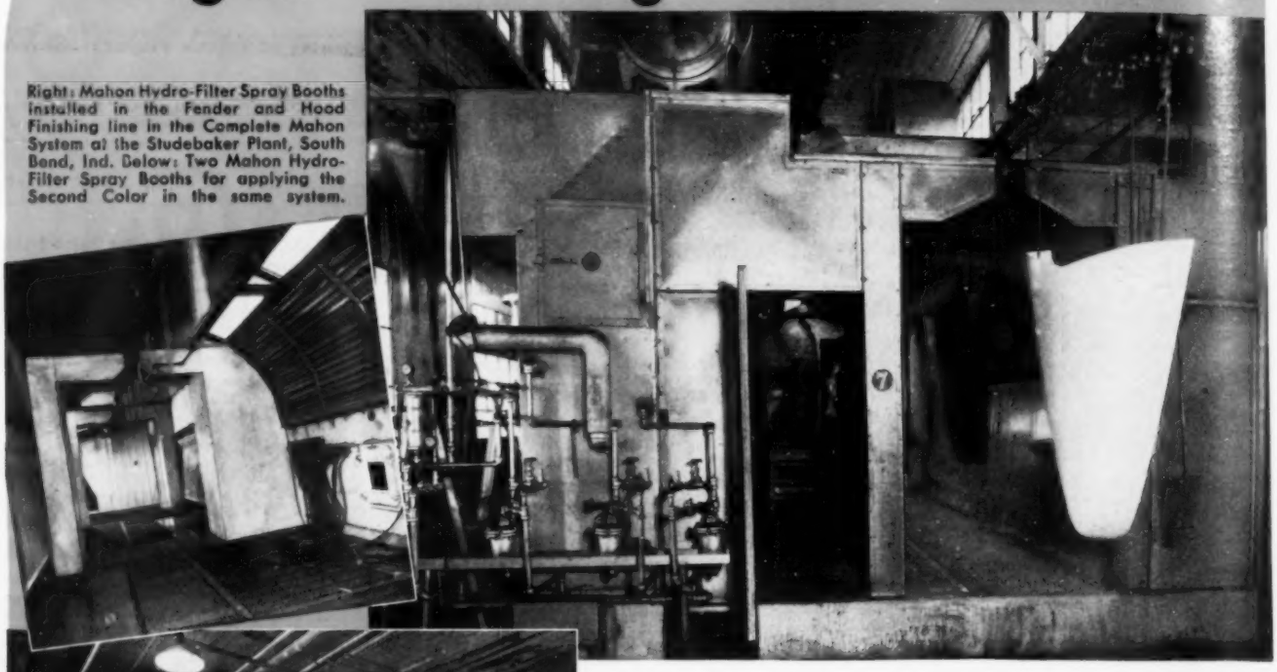
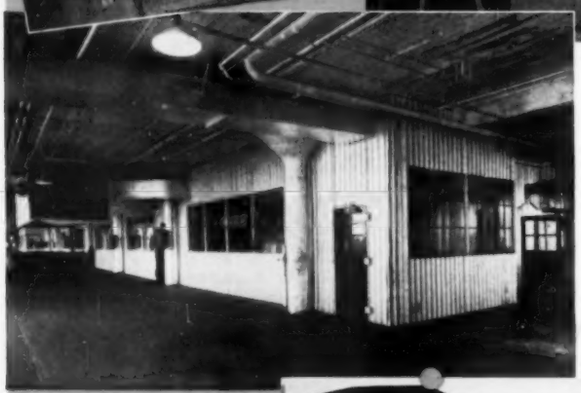
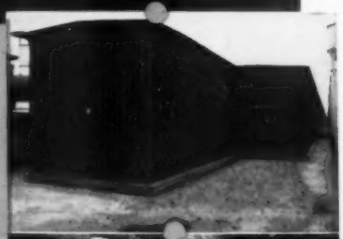


Right: Mahon Hydro-Filter Spray Booths installed in the Fender and Hood Finishing line in the Complete Mahon System at the Studebaker Plant, South Bend, Ind. Below: Two Mahon Hydro-Filter Spray Booths for applying the Second Color in the same system.





Above: Steel and Glass Enclosure of Air Conditioned Spray Room—part of the Complete Mahon System at Studebaker's South Bend Plant. At Right: Mahon Enamel Baking Oven installed on the roof of the plant—part of the same installation. At Right Below: Mahon Enamel Baking Oven installed inside the plant for Baking Second Color on Studebaker Hoods.

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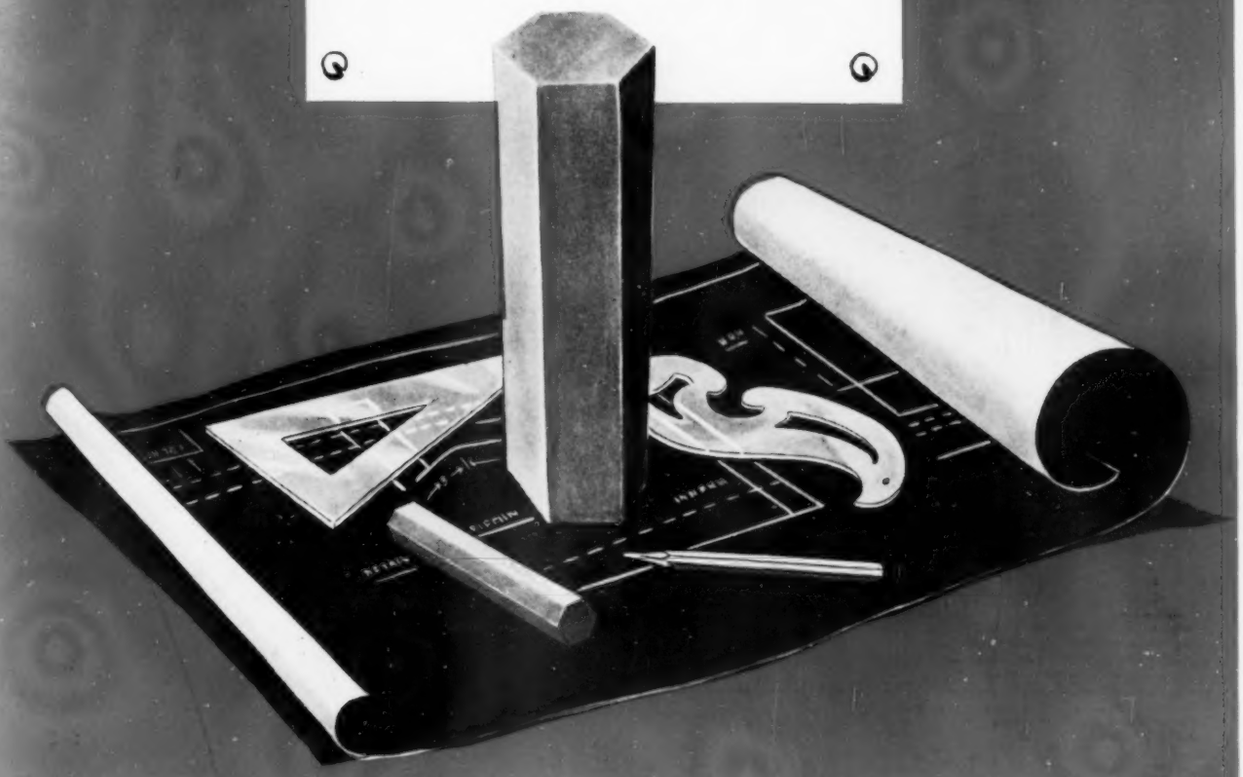

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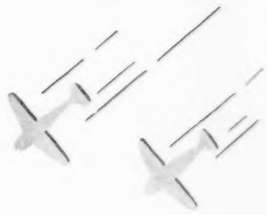

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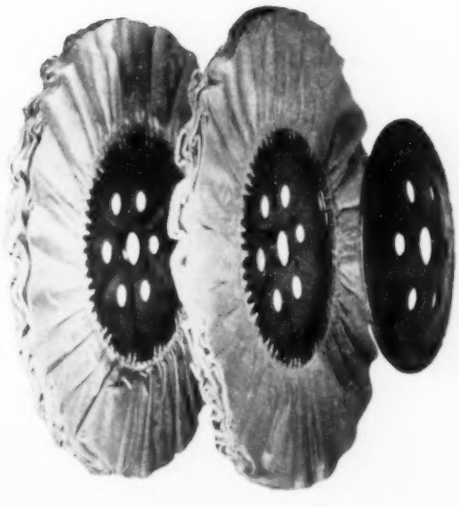

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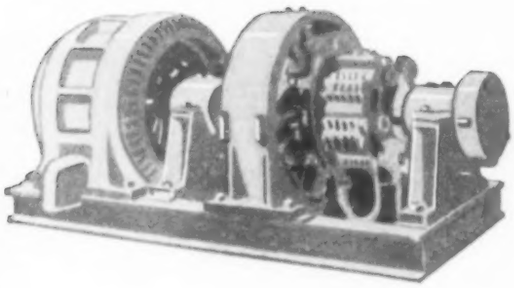

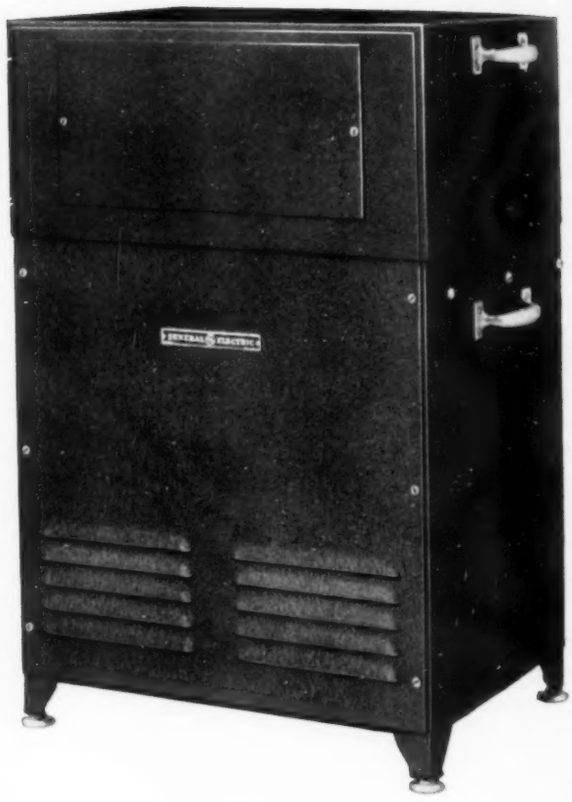

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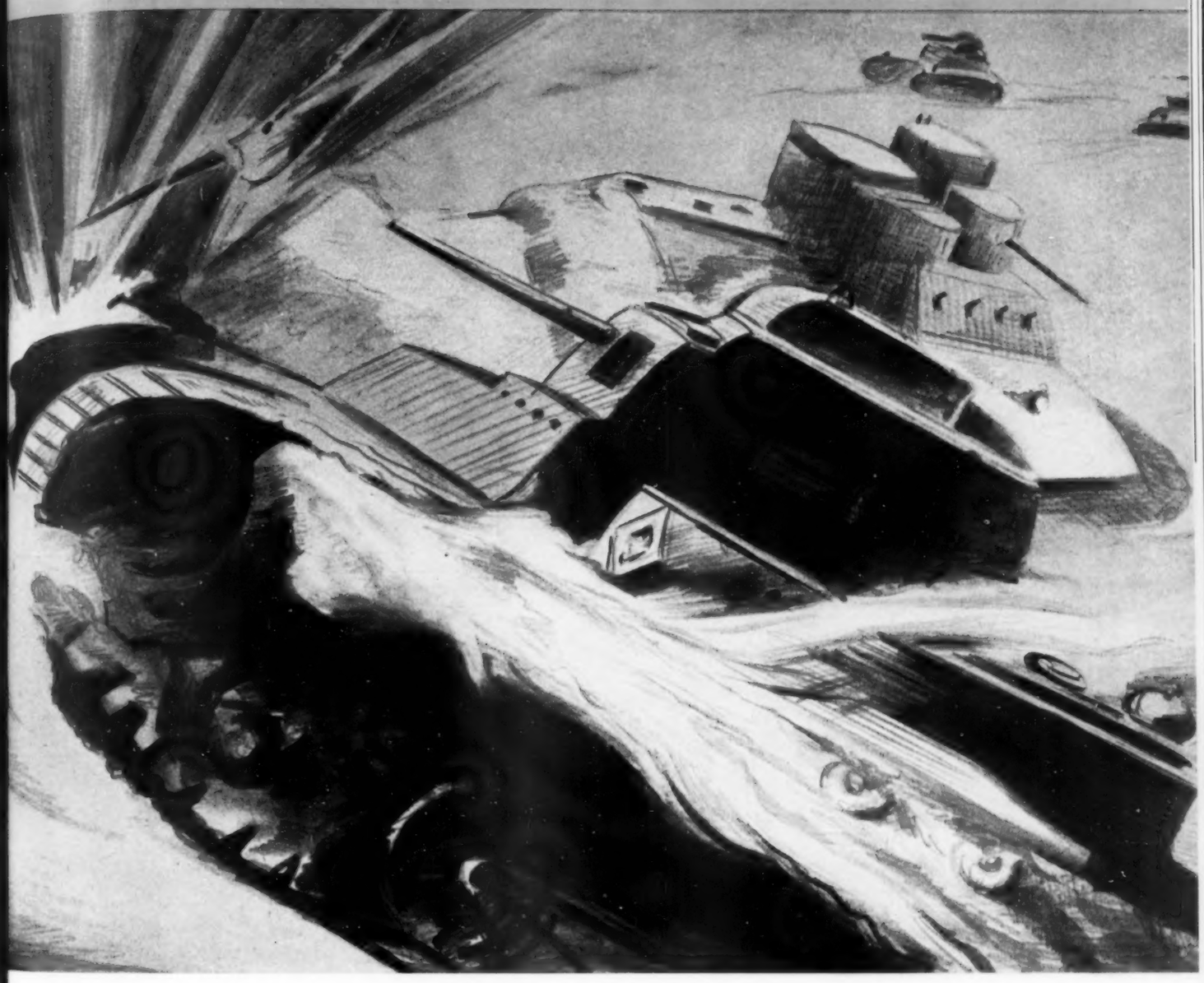

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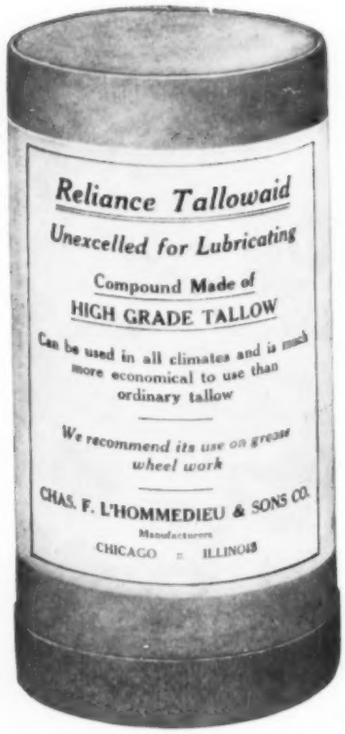
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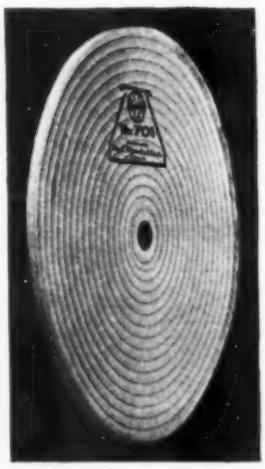

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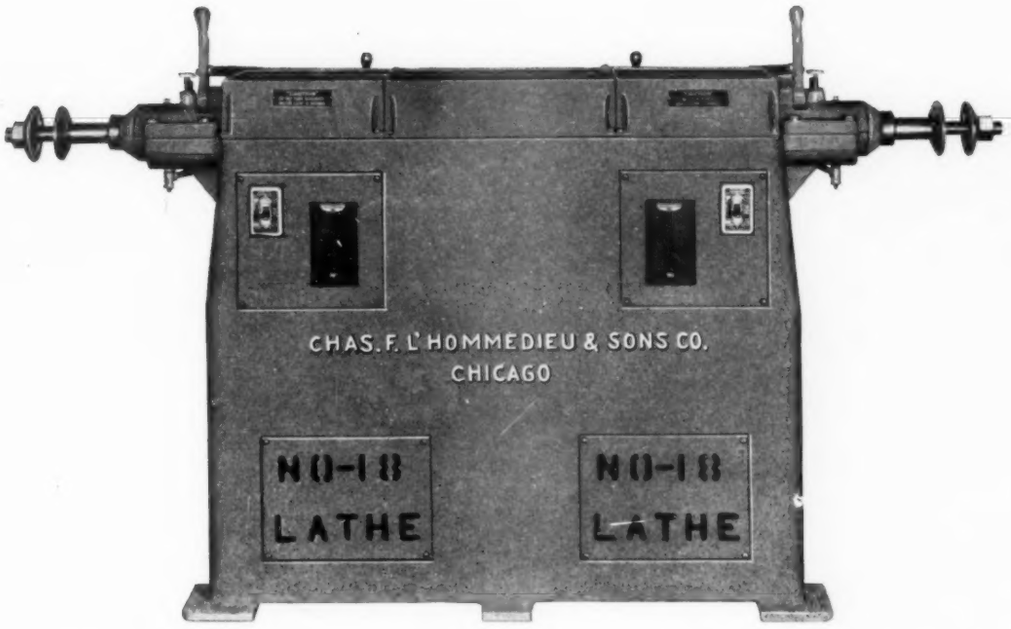

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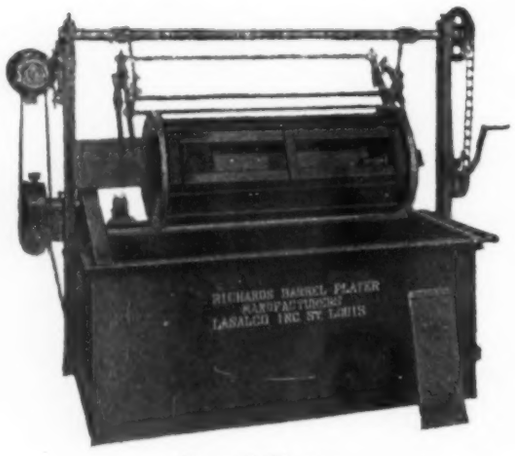

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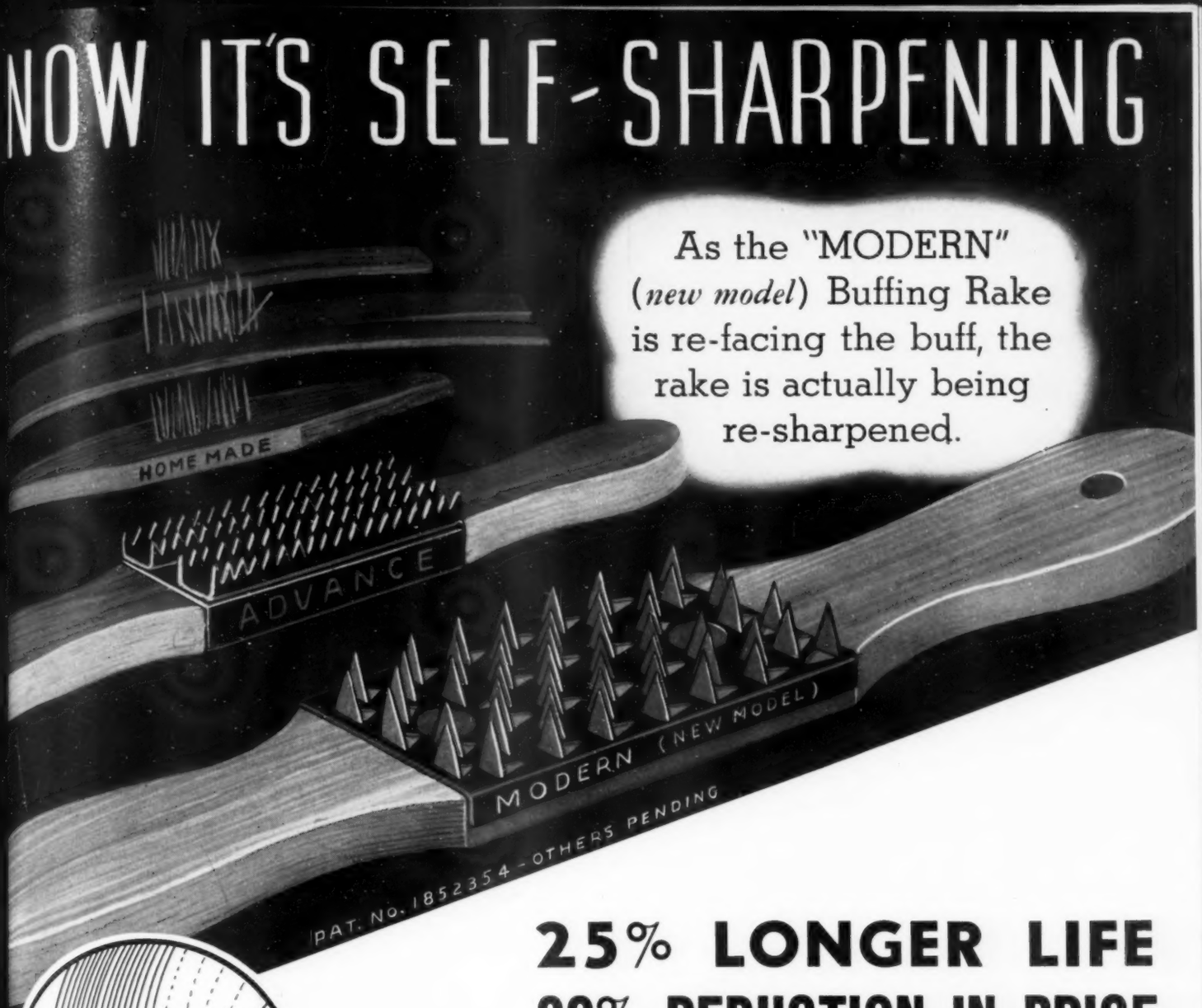

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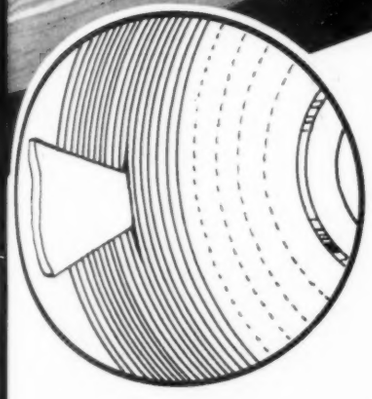

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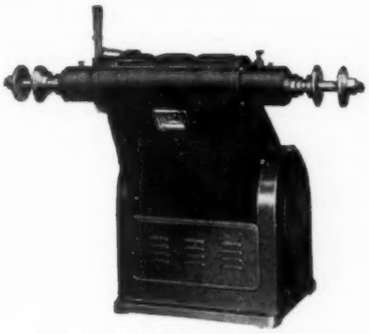

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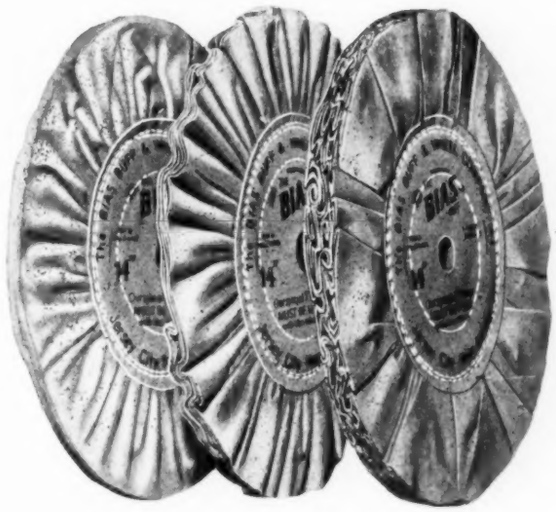

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for general service. Fast cutting.	—for heavy cutting down work. Wears long.	Overlap ply. No waste of cloth or compound.

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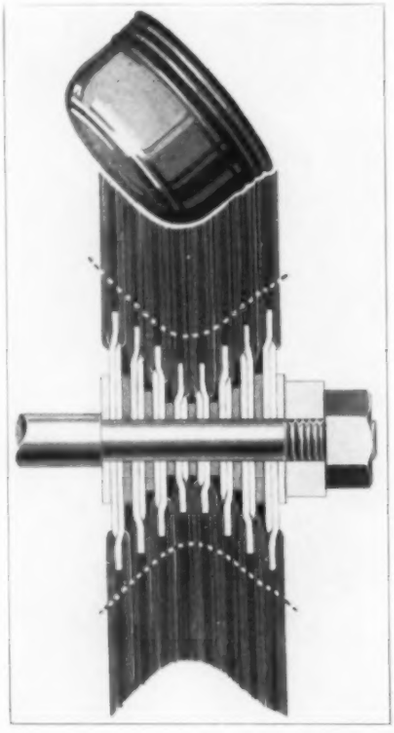
428 Communipaw Ave. Jersey City, N. J.



WITH "PERM-A-CORE" BUFFS

ANY NECESSARY DENSITY IS OBTAINABLE

Any necessary density can be obtained with the Perm-A-Core Buff by the use of the number of plies in the buff itself or by the addition of ¼" thick washers between each set of flanges. (See illustration.) This in itself does away with the purchase of several kinds of buffs for different classes of work. With the addition of ¼" washers between flanges, the density is made softer while with flanges back to back, the density is harder. Any intermediate density is obtained by inserting, between the flanges, thinner washers such as 1/16", ⅛" or 3/16" thick.

Investigate—Write for Information

SAVE THE O CORE

ADVANCE POLISHING WHEELS, INC.

844 WEST 49TH PLACE **CHICAGO, ILLINOIS**

Christmas Greetings!

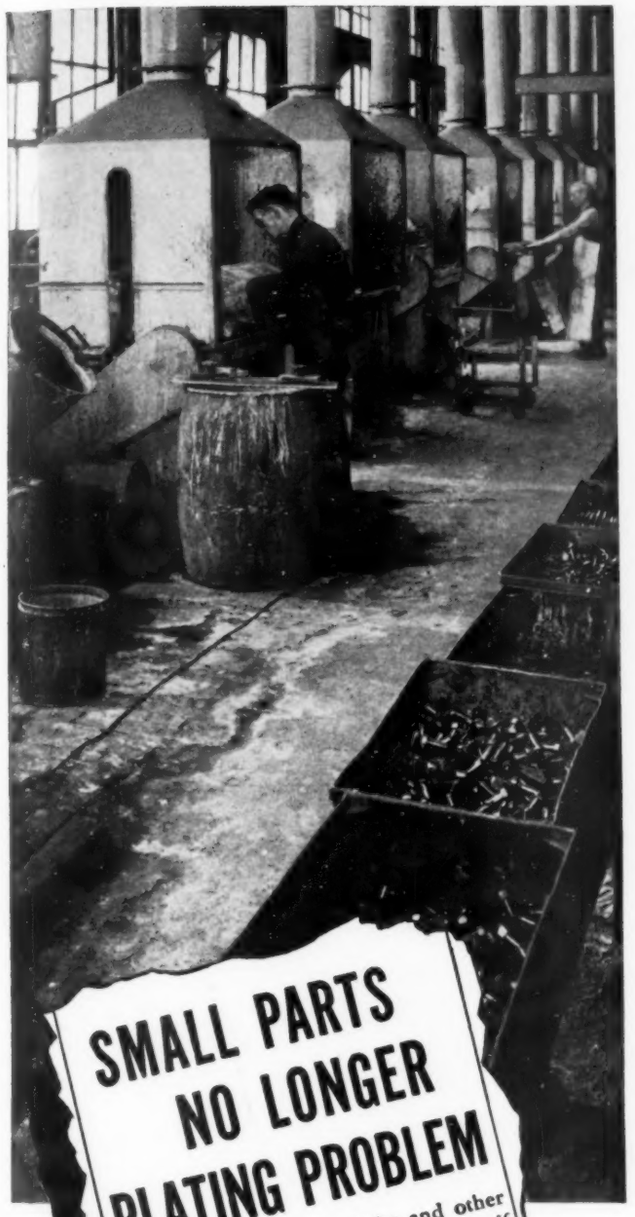
AS another year draws to a close, we extend to you our best wishes for the Christmas season and for the New Year.

We are appreciative of your friendship and of the patronage you have given us. We pledge our best efforts to make MATCHLESS PRODUCTS and MATCHLESS SERVICE of even greater value to you.

As the New Year advances may it bring you an increasing measure of prosperity and happiness.

THE MATCHLESS METAL POLISH CO.

840 W. 49th Pl., Chicago, Ill. **726 Bloomfield Ave., Glen Ridge, N. J.**



SMALL PARTS NO LONGER PLATING PROBLEM

(Special) Nails, washers, bolts and other small hardware present no problem if the cleaning is thorough. With the cleaning bath made up of Metso 66 a large electrical manufacturer now finds it easier to control rejects in cadmium plating.

Because of its special emulsifying ingredient, Metso 66 is speedy and effective in removing all types of mineral oil and greases.

Let us tell you how Metso 66 can improve plating results in your plant.

METSO CLEANERS

PHILADELPHIA QUARTZ COMPANY

General Offices and Laboratory: 125 S. Third St., Phila., Pa.
Chicago Sales Office: 205 W. Wacker Drive. Stocks in 60 cities.
Sold in Canada by NATIONAL SILICATES LTD., Toronto, Ont.

KIRK & BLUM

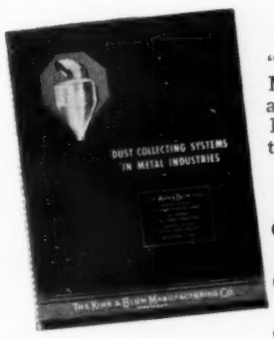
will Solve Your

DUST CONTROL PROBLEMS

New Castings Cleaning Department, Monarch Machine Tool Co. Fine particles which ordinarily would fill the air, are now exhausted through top grilles of grinding bucks on which work is placed. In the Sanding Department, shown in rear, down draft ventilation through grille-topped tables makes sanding operation on painted castings clean, safe and eliminates need for masks.

The unique System recently installed in the new addition to the Monarch Machine Tool Company plant at Sidney, Ohio, is another outstanding example of how Kirk & Blum Engineers design, engineer and install Dust Control and Fume Removal Systems to meet individual plant requirements. The top of each working station is a large grating through which air is exhausted to pull away all dust, rust, sand, paint spray, etc. These gratings are so located that the workmen never inhale dust or fumes, nor do they have to work in a bent-over position. All piping is entirely under the floor.

Regardless of what your dust or fume removal problems may be, Kirk & Blum Engineers, backed by a third century of specialized experience, can solve them to your complete satisfaction. Every Kirk & Blum Installation is covered by a written performance guarantee.



SEND FOR THIS BOOK

"Dust Collecting Systems in Metal Industries". Illustrates and describes interesting Kirk & Blum installations throughout the country.

OTHER K. & B. BOOKS

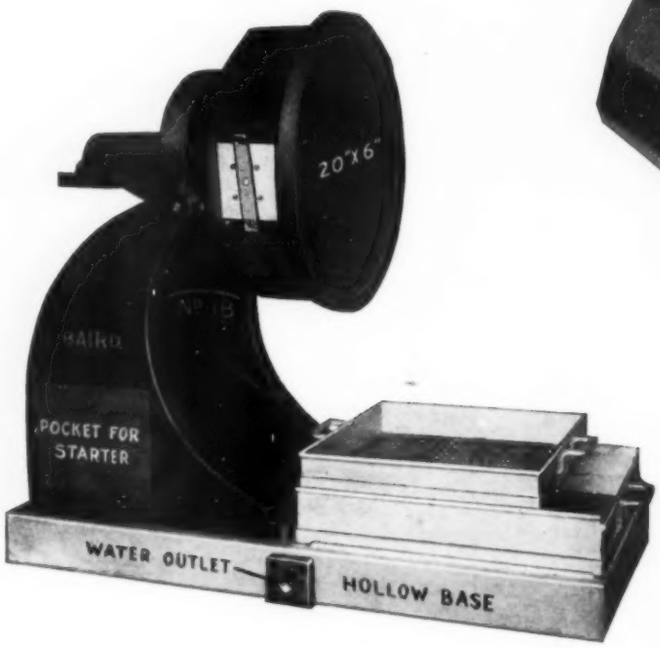
- "Blower Systems for Woodworking Plants"
- "Fan Systems for Various Industries"
- "Industrial Ovens"

Mailed on request to interested executives.

THE KIRK & BLUM MFG. CO.

2859 Spring Grove Ave. Cincinnati, Ohio

HORIZONTAL BARRELS **TILTING BALL BURNISHING BARRELS**

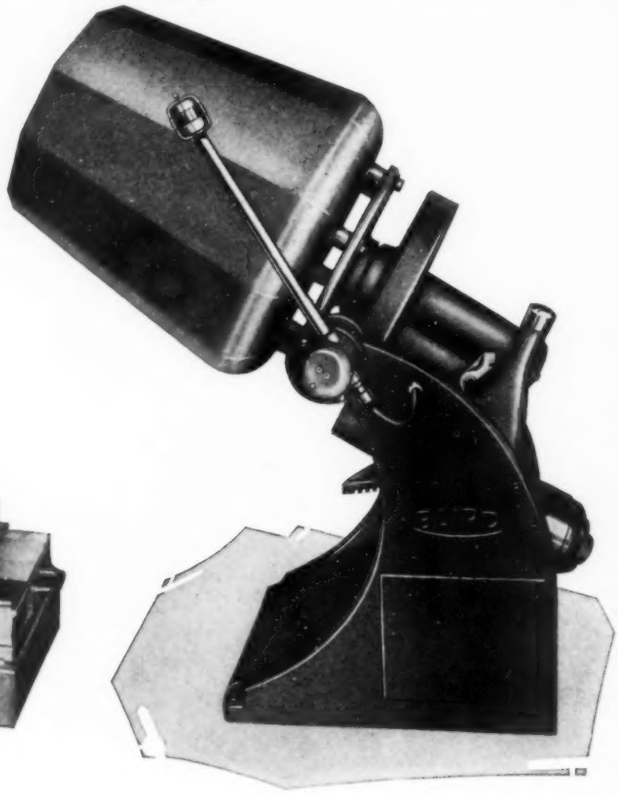


This shows a High and Narrow Type of Barrel mounted on "Baird" Model B. or Pedestal Type Motor driven Oblique Tilting Tumbler.

As shown the barrel was lined for use for burnishing with hardened steel balls.

These barrels may be of any suitable material depending on the job. Cast iron or fabricated steel unlined or lined with rubber etc. for rolling in abrasives.

Made in 20" dia. x 6" for No. 1 Tumbler
Made in 24" dia. x 8" for No. 2 Tumbler



This shows the side of a No. 1 BAIRD Model B. Single Oblique Tilting Tumbler with a No. 22 Sheet Steel Polygonal Barrel and with an Automatic Electrical Tilting Device.

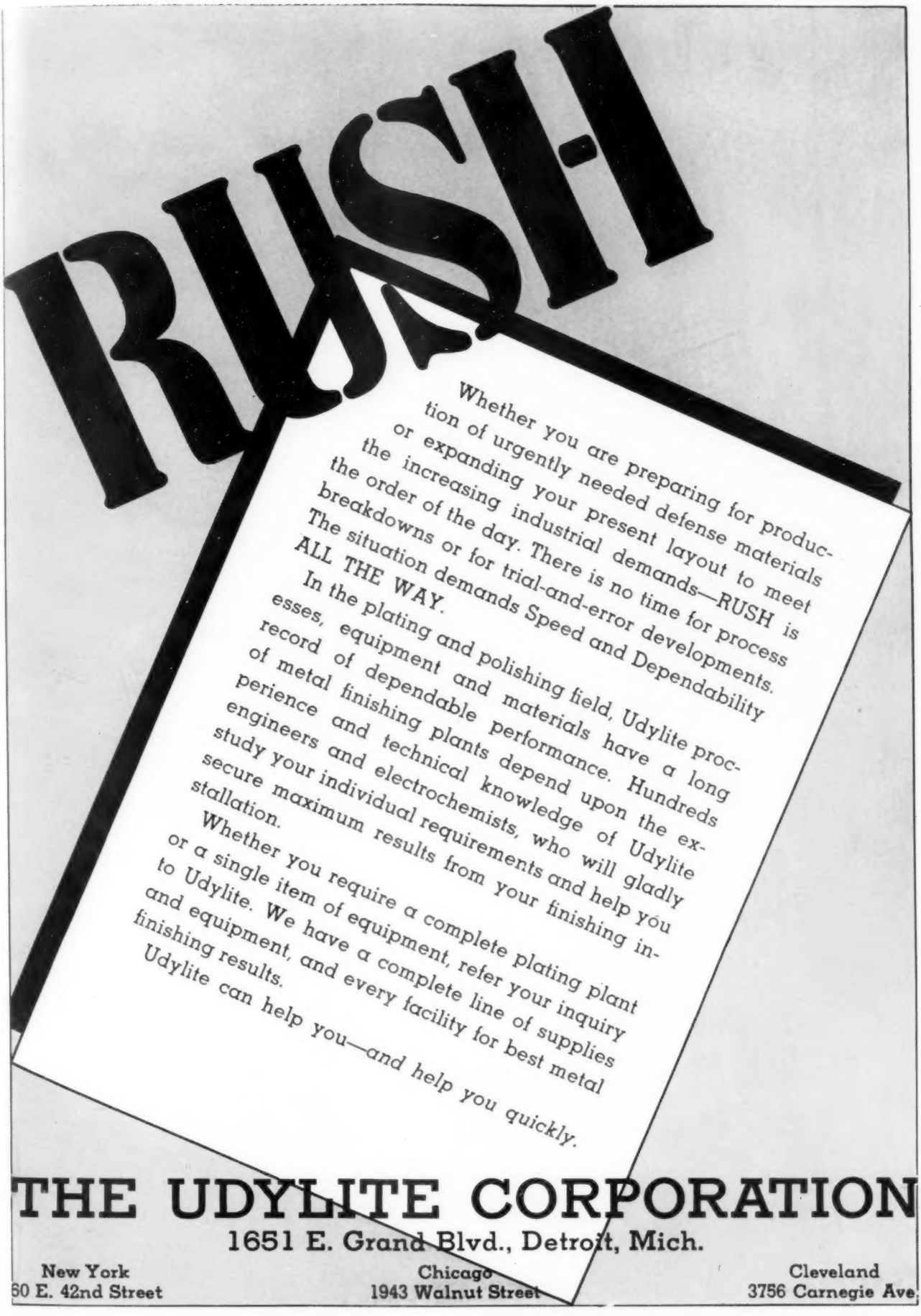
This device AFFORDS GREATEST SAFETY—LEAST LABOR—LEAST FLOOR SPACE—LEAST AMOUNT OF DISTANCE TO MOVE WORK in USING the tumbling barrels. SAVES TIME AND FLOOR SPACE.

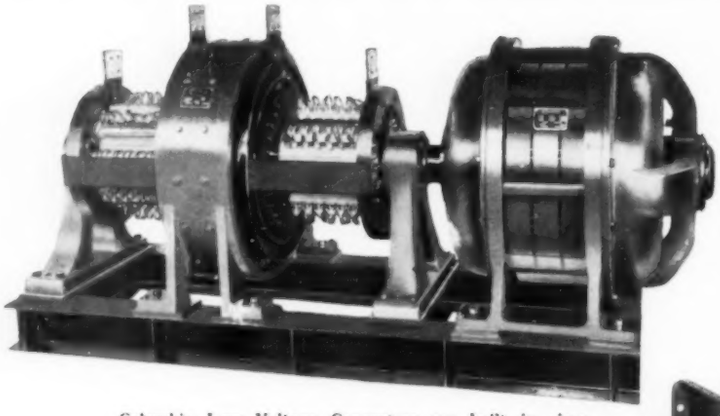
When tumbling questions come up "ASK BAIRD ABOUT IT"

THE BAIRD MACHINE COMPANY

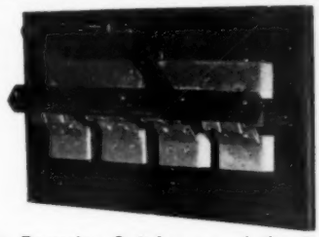
BRIDGEPORT, CONNECTICUT

Since 1846 specializing in high production machinery for articles of wire and for ribbon metal. Also machines to turn, bore, etc., castings, forgings, etc., up to 10½" diameter.


RUSH!
Whether you are preparing for production of urgently needed defense materials or expanding your present layout to meet the increasing industrial demands—RUSH is the order of the day. There is no time for process breakdowns or for trial-and-error developments. The situation demands Speed and Dependability ALL THE WAY.
In the plating and polishing field, Udylite processes, equipment and materials have a long record of dependable performance. Hundreds of metal finishing plants depend upon the experience and technical knowledge of Udylite engineers and electrochemists, who will gladly study your individual requirements and help you secure maximum results from your finishing installation.
Whether you require a complete plating plant or a single item of equipment, refer your inquiry to Udylite. We have a complete line of supplies and equipment, and every facility for best metal finishing results.
Udylite can help you—and help you quickly.
THE UDYLITE CORPORATION
1651 E. Grand Blvd., Detroit, Mich.
New York
60 E. 42nd Street
Chicago
1943 Walnut Street
Cleveland
3756 Carnegie Ave.



Columbia Low Voltage Generators are built in sizes of ½ to 250 KW, 100 to 40,000 amperes, 6 to 60 volts.



Columbia Reversing Switches are of the double pole, double throw type for use as a reversing switch or series parallel switch on circuits up to 15 volts, 200 to 2,000 amperes.

Rheostat sizes range from 15 to 5,000 amperes and with a 3 to 6 volt drop.

Designed and Built to Meet the Exacting Needs of the Modern Plating Department and for 24-hour Daily Operation.

COLUMBIA ELECTRIC MFG. CO., 4512 Hamilton Ave., Cleveland, Ohio

COLUMBIA

LOW VOLTAGE GENERATORS

PLATING TANK RHEOSTATS

REVERSING SWITCHES

DURIRON and DURICHLOR

CENTRIFUGAL PUMPS
Standard
Self-Priming

VALVES
Y Type
Lubricated
Quick-Releasing

HEAT EXCHANGERS
Heating and
Cooling Units

PIPE and FITTINGS

The high silicon irons, *Duriron* and *Durichlor*, handle plating solutions regardless of character without deterioration or contamination.

The largest producers in the automotive and other fields are using Duriron and Durichlor equipment to reduce costs and increase production.

These bulletins are available—write for them.

HEAT EXCHANGERS
Bulletin No. 1601

CENTRIFUGAL PUMPS
Bulletin No. 810

VALVES AND COCKS
Bulletin No. 601

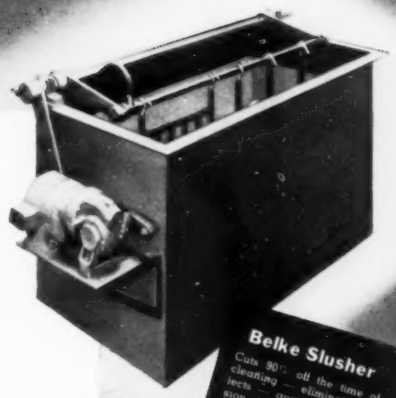
PIPE AND FITTINGS
Bulletin No. 702

THE DURIRON COMPANY, Inc.

437 No. Findlay St. DAYTON, OHIO

BELKE PRESENTS MANY NEW ITEMS for 1940

Wm. E. Belke — Pres.



Belke Slusher

Cuts 90% off the time of cleaning — eliminates rejects — guarantees adhesion of plate to base metal.

BULLETIN No. 1048

Steam Sawdust Barrel

Finest and Surest Method of Obtaining bright clean finished products free from water stain.

BULLETIN No. 952

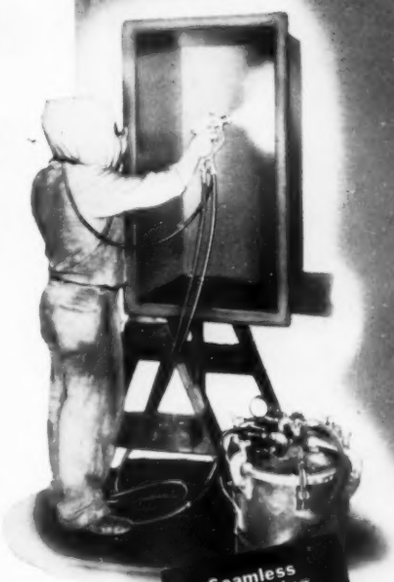
LABOR AND TIME SAVING DEVELOPMENTS

First with the most essential equipment in the Plating Room. Belke Manufacturing Company now has many contributions for the industry.

Each and every new item saves its own cost many times over in the course of a year by

(1) Eliminating manual labor and hard work.
(2) Improving the finished product.
(3) Saving material and anode metal.

Belke Equipment is a fundamental necessity in every Plating Room.



Seamless Tank Lining

A smooth - homogeneous lining in any thickness — high tensile strength — seamless and fine for plating solutions.

Sawdust Separator

Mechanical operated shaker does the work thoroughly in one-tenth the time.

BULLETIN No. 700

BELKE MODERN INSULATED PLATING RACKS WITH REPLACEABLE TIPS FOR 1940

A word must be said about Racks for which Belke is known the world over, having furnished mostly all the manufacturers for the past twelve years.

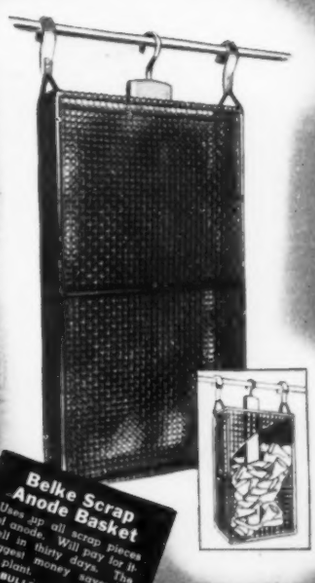
We have developed new rubber coatings that stand up satisfactorily in the Degreaser and Chrome.

Plating Racks can be furnished that will be most efficient in any plating solution and, if necessary, pass through the complete cycle from Degreaser to Chrome, if required.

For efficiency—greater production and perfect insulation—Let Belke build your Plating Racks.

BELKE MFG. COMPANY

947 N. Cicero Ave., Chicago



Belke Scrap Anode Basket

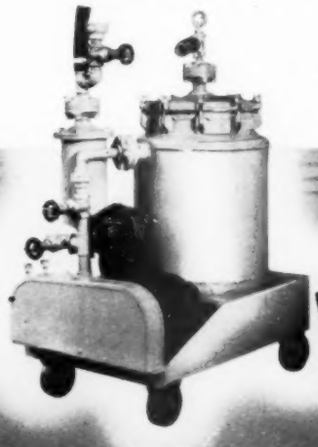
Uses up all scrap pieces of anode. Will pay for itself in thirty days. The biggest money saver in the plant.

BULLETIN No. 10

Tank Magnet

A light handy tool capable of lifting 52 lbs.—for removal of lost parts from plating tanks.

BULLETIN No. 830



Plating Solution Filters

Seven different sizes to choose from. Capacity 300 gallons to 2000 gallons per hour.

BULLETIN No. 1000

Write today for prices and descriptive bulletins.

Where only seeing is believing

SEYMOUR

"Seycast"

NICKLE ANODES

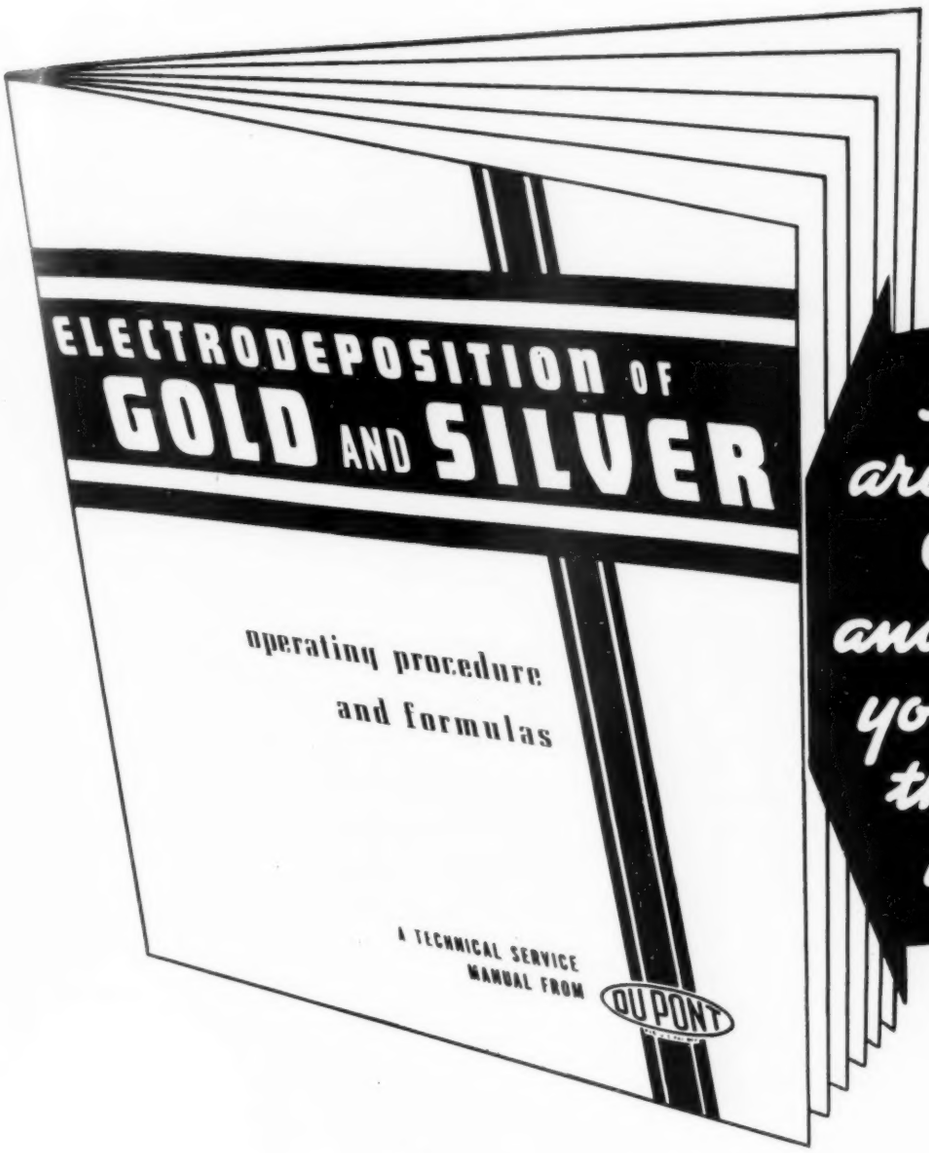
"Seycast" Nickel Anodes have a scientifically controlled grain that tends to eliminate loose nickel in low pH baths. This is due to the fact that corrosion occurs uniformly on the surface of a structure of long, narrow grains which are anchored spoke-like to the center of the anode. See adjoining illustration.

"Seycast" are 99%+ cast Nickel Anodes. Designed primarily for Bright Nickel plating, but excellent in any hot Watts bath having a pH of 4.5 or lower. Write for technical data on these anodes, also on

SEYMOUR BRIGHT NICKEL

—a hot organic type process yielding brilliant deposits from a standard hot nickel bath without the usual coloring or buffing.

THE SEYMOUR MANUFACTURING COMPANY, 70 FRANKLIN ST., SEYMOUR, CONN.



If you are Plating **GOLD** *and* **SILVER**.. *you'll find this book useful—*

YOU'LL find it full of useful facts that you can apply in your operations. Arranged for quick and easy reference—it contains practical information, based on du Pont's extensive plating research and field experience. The technical data will help you get dependable results in plating goldware and silverware articles—flatware, hollowware, costume jewelry, etc., with Du Pont Precious Metal Cyanides.

Solution control, operation and maintenance, typical formulas for various colors and finishes, how to analyze solutions—it contains just the information you need to help you plan for speedy, economical and efficient production in your gold and silver plating. Write for your copy today.

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"Cavalcade of America"—back on the air—every Wednesday 7:30 P. M. E. S. T. Nation-wide Network.

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ELECTROPLATING
CHEMICALS
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E. I. DU PONT DE NEMOURS & CO. (INC.)
ELECTROPLATING DIVISION
WILMINGTON, DELAWARE

Please send me my copy of the new book—"Electrodeposition of Gold and Silver".

FIRM_____

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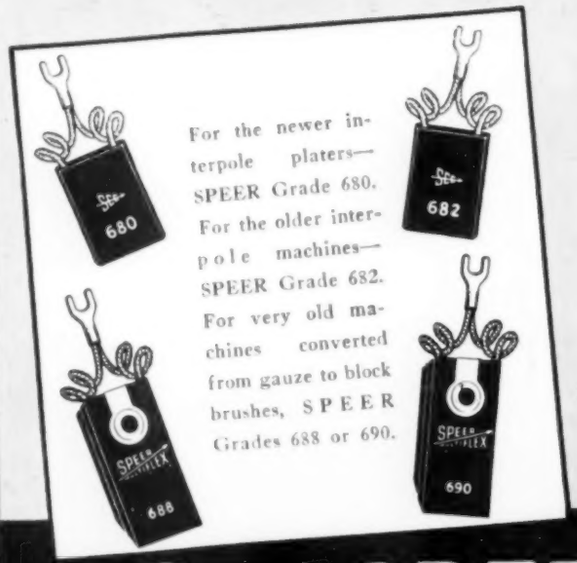
MF12

Rare Ingredients Important in Generator Brushes



For the newer interpole platers—SPEER Grade 680. For the older interpole machines—SPEER Grade 682. For very old machines converted from gauze to block brushes, SPEER Grades 688 or 690.

ALMOST anybody can mix powdered copper and graphite and produce some metal graphite brushes that will "work" on a plating generator. How well they will work depends on the experience and facilities of the maker.

When you buy SPEER Brushes, you get important rare ingredients—among them the perfected result of more than forty years of experience, of hundreds of thousands of dollars invested in research, of several millions of dollars invested in production facilities, testing and quality-control equipment, and personnel.

When you equip your generators with SPEER Brushes, you can get the most out of your machines in efficient, dependable, uniform performance—all reflected in lower plating cost. SPEER commutation specialists are at your service to help you choose brush grades exactly suited to your conditions. Consult them freely.

SPEER CARBON CO.

ST. MARYS, PA.

CHICAGO • CLEVELAND • DETROIT • MILWAUKEE
NEW YORK • PITTSBURGH

SCC **SPEER BRUSHES**

STEVENS

NICKEL BUFFING COMPOSITIONS

Enjoy a clearer, more lustrous, more beautiful finish on the parts you buff. Obtain that finish quickly and easily by using Stevens Lime Compositions.

HERE'S WHAT USERS SAY—

"An outstanding product. Best I ever used, and that covers 30 years' experience. Fast cutting, beautiful finish and cleans perfectly for chrome plating."

"Produces the best and clearest luster of any lime finish we've ever tried. Much better than what we were using."

"Very fine lime for all around use. Lasts long and is very slow slacking."

You, too, can profit by using Stevens Nickel Buffing Compositions. Write for samples.

No. 650 Hi-Luster
(White) Medium dry grade.

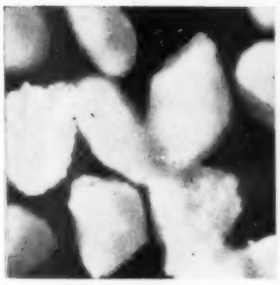
No. 600 Fast Finish
(White) Wet, fast cutting, for heavy work.

A favorite for years.

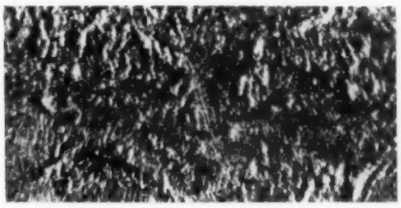
White Rose is a medium dry grade. It cuts fast and brings up a clear luster quickly.

All grades are packed either in tin cans or in air-tight foil-lined cartons—light in weight, easy to open.

WHY STEVENS LIME COMPOSITION IS BETTER



Powdered Lime—Magnified 150 Times



Nickel Plated Surface Before Buffing—Magnified 100 Times

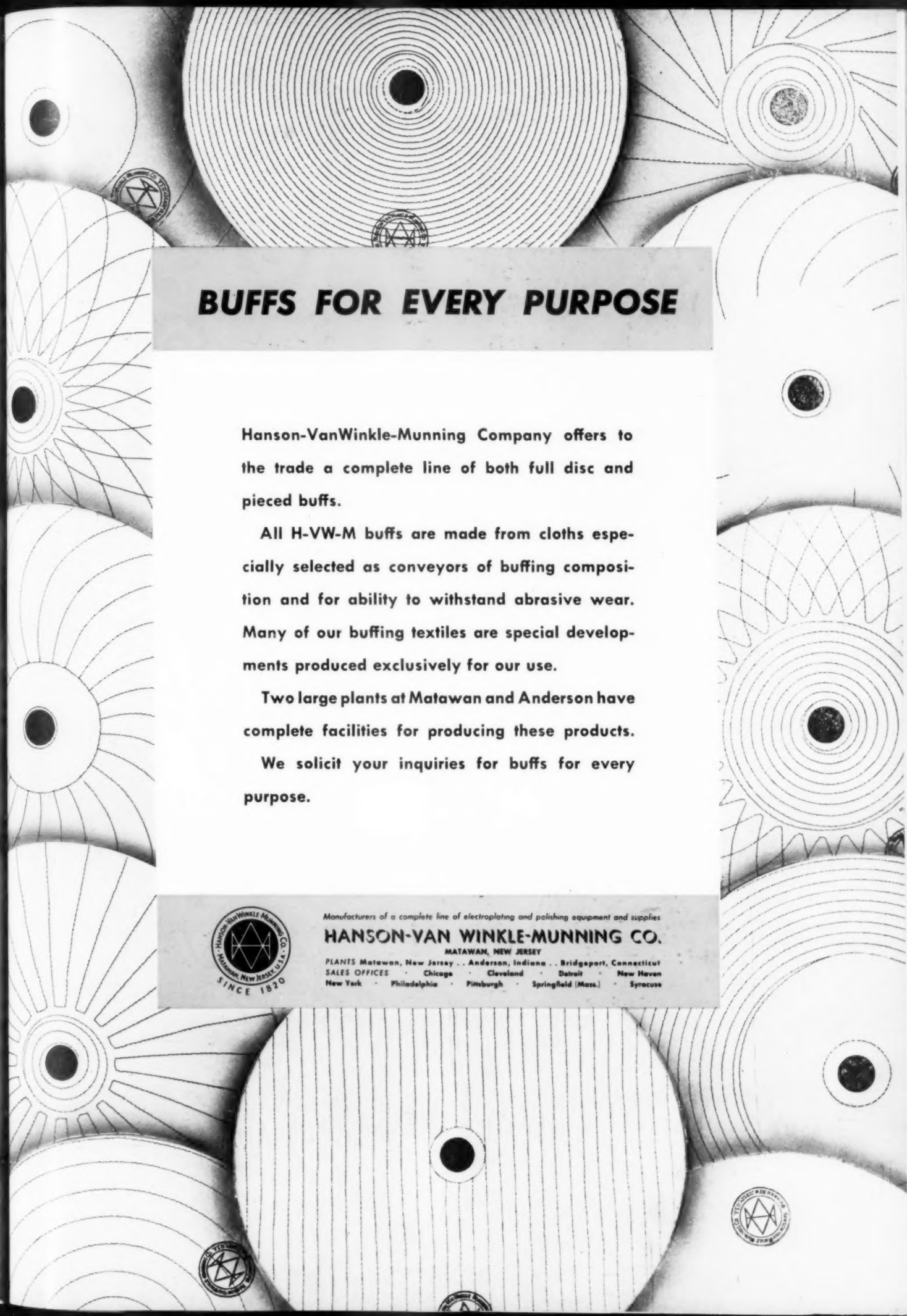
Only specially selected, soft, calcined lime is used. This is very finely ground and properly blended, under laboratory control, with the right selection and mixture of binders. Individual mixing kettles for each grade avoid the possibility of contamination.

Thus, a nickel plated surface, as pictured above, becomes, after buffing with Stevens Lime, a clear, lustrous, beautiful finish, free from polishing lines and scratches.

"Ask the Man at the Wheel"

FREDERIC B. STEVENS, INC.
DETROIT, MICHIGAN
New Haven Buffalo Cleveland Indianapolis Windsor Toronto
"EVERYTHING FOR THE POLISHING AND PLATING PLANT"

US
EQUIPMENT
SINCE 1896
For Plating, Metal Cleaning, Pickling, Acid Dipping, Drying and Allied Operations
FULLY AUTOMATIC SEMI AUTOMATIC
MANUALLY OPERATED
PLATING BARREL APPARATUS
STILL TANK PLATING EQUIPMENT
VARIABLE SPEED PLATING APPARATUS
AUTOMATIC CLEANING & PLATING UNITS
CONTINUOUS ACID TREATMENT EQUIPMENT
MECHANICAL CLEANING APPARATUS
ELECTROLYTIC PROCESSING UNITS
GENERATOR EQUIPMENT
DRYERS, ETC.
U. S. GALVANIZING & PLATING EQUIPMENT CORPORATION
Incorporated 1896
40 Heyward Street, Brooklyn, N. Y., U.S.A.



BUFFS FOR EVERY PURPOSE

Hanson-VanWinkle-Munning Company offers to the trade a complete line of both full disc and pieced buffs.

All H-VW-M buffs are made from cloths especially selected as conveyors of buffing composition and for ability to withstand abrasive wear. Many of our buffing textiles are special developments produced exclusively for our use.

Two large plants at Matawan and Anderson have complete facilities for producing these products.

We solicit your inquiries for buffs for every purpose.

Manufacturers of a complete line of electroplating and polishing equipment and supplies

HANSON-VAN WINKLE-MUNNING CO.

MATAWAN, NEW JERSEY

PLANTS Matawan, New Jersey . . Anderson, Indiana . . Bridgeport, Connecticut

SALES OFFICES · Chicago · Cleveland · Detroit · New Haven · New York · Philadelphia · Pittsburgh · Springfield (Mass.) · Syracuse

The H-VW-M Type MI Lathe is rugged in construction and the design eliminates vibration and assures smooth performance with long life.

Spindle drive is through heavy duty high speed "V" belts which can be quickly changed by a new and simple method without disturbing spindle bearings or alignment. Any spindle speed within the range of 1800 to 3600 RPM is available, with other speeds by changing motor sheave pulley.

Among other features are "V" belt tension adjustment and lock, automatic spindle brake, bronze spindle nuts, continuous type N.E.M.A. motor with magnetic starter, and tray for composition and tools.

This lathe is furnished in 3, 5, 7½ and 10 H.P. sizes and motor is mounted inside base.

LATHES FOR METAL FINISHING

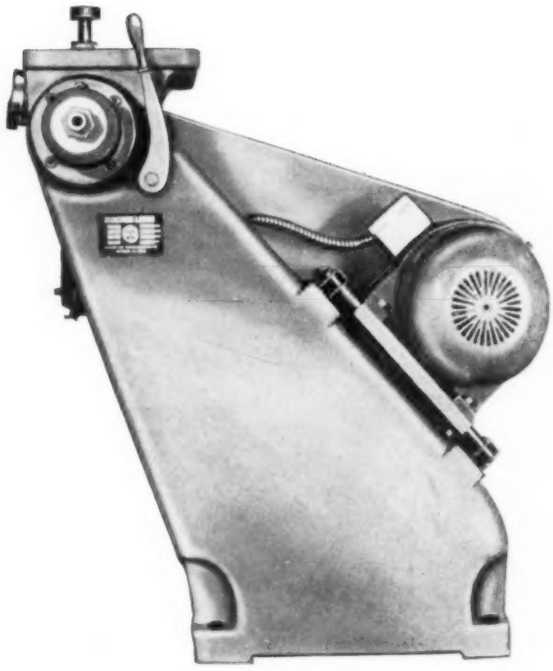
The H-VW-M Type MO Lathe has been designed for a range of work not requiring a heavy duty machine.

Spindle is of alloy steel and turns on circular flanged ball bearing units mounted at the ends of the housing for proper spacing and to rigidly support the spindle. A generous overhang for clearance is furnished.

Any one speed within the range of 1800 to 3600 RPM can be obtained through "V" belt drive, and by changing the motor sheave pulley; other speeds within this range can be had. Quick "V" belt change feature is provided without disturbing the spindle or bearing alignment.

Additional features include flat top spindle threads, right-hand end of spindle tapped for taper point, bronze spindle nuts, heavy cast iron machined spindle flanges, spindle lock, adjustable belt tension, continuous duty N.E.M.A. motor, and starter recessed against mechanical damage.

This lathe is furnished in 3 and 5 H.P. sizes with mechanical type starter and in 7½ H.P. size with magnetic type push button operation. Motor is mounted on rear in all sizes.



Manufacturers of a complete line of electroplating and polishing equipment and supplies

HANSON-VAN WINKLE-MUNNING CO.

MATAWAN, NEW JERSEY

PLANTS Matawan, New Jersey . . Anderson, Indiana . . Bridgeport, Connecticut

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New York · Philadelphia · Pittsburgh · Springfield (Mass.) · Syracuse

BUSINESS WANTS For Sale—Equipment, Etc.

FOR SALE
(AVAILABLE FOR IMMEDIATE SHIPMENT)

2—4000/2000 Ampere, 6/12 Volt, EAGER ELECTRIC CO. Motor Generator Sets, Complete with Panel Board Arrangements. Factory-Built Units.

1—2500/1250 Ampere, 6/12 Volt, IDEAL ELECTRIC CO. Motor Generator Set. Complete with Full Panel Board Arrangement. Excellent condition.

1—2000/1000 Ampere, 6/12 Volt, CONNECTICUT DYNAMO & MOTOR CO. (Improved American Giant Type) INTERPOLE—Motor Generator Set, Excellent Condition Throughout, with Controlling Equipment.

1—1750/875 Ampere, 6/12 Volt, HANSON & VAN WINKLE CO. Motor Generator Set. Excellent Condition Throughout. Complete with Full Panel-Board Arrangement.

1—1500/750 Ampere, 6/12 Volt, ELECTRIC PRODUCTS CO. (INTERPOLE DESIGN) BALL-BEARING, Very Late Type Motor Generator Set. Like New and Complete with Full Panel Board Arrangement.

1—1500/750 Ampere, 6/12 Volt, HANSON & VAN WINKLE CO. Motor Generator Set, Excellent Condition Throughout and complete with Panel Board.

1—1500/750 Ampere, 6/12 Volt, CONNECTICUT DYNAMO & MOTOR CO. (Improved American Giant Type) Motor Generator Set, Excellent Condition Throughout, and complete with Panel-Board.

1—1000 Ampere, 10 Volt, HANSON & VAN WINKLE CO. Motor Generator Set, Complete with Full Panel Board Arrangements, excellent condition throughout.

1—1000/500 Ampere, 6/12 Volt, CHAS. F. L'HOMMEDIEU & SONS CO. Motor Generator Set, Excellent shape throughout, complete with Full Controlling Equipment.

1—800/400 Ampere, 6/12 Volt, EAGER ELECTRIC CO. Motor Generator Set, perfect condition, complete with Panel-Board.

1—750/375 Ampere, 6/12 Volt, HANSON-VAN WINKLE-MUNNING CO. Motor Generator Set, Excellent Condition Throughout, With Panel Board.

8—80/40 Ampere, 12/24 Volt, CROCKER-WHEELER ELECTRIC CO. (Brand New) Ball-Bearing Design, Motor Generator Sets, with direct connected exciters, (factory-built) with Panel-Boards. Latest Design.

3—BAIRD MACHINE CO. DOUBLE No. 2 Size, Ball Burnishing Barrels, Excellent Shape.

2—BAIRD MACHINE CO. SINGLE NO. 2 Size, Ball Burnishing Barrels, Excellent Shape.

4—ABBOTT BALL CO. (BURNISHING BARRELS—Various Sizes)—Excellent Condition.

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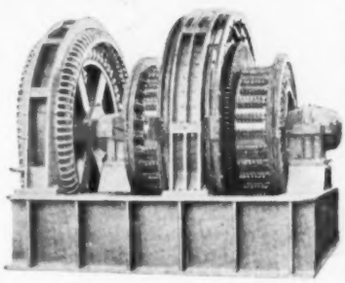

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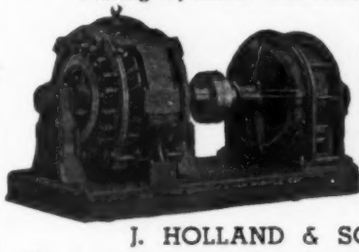

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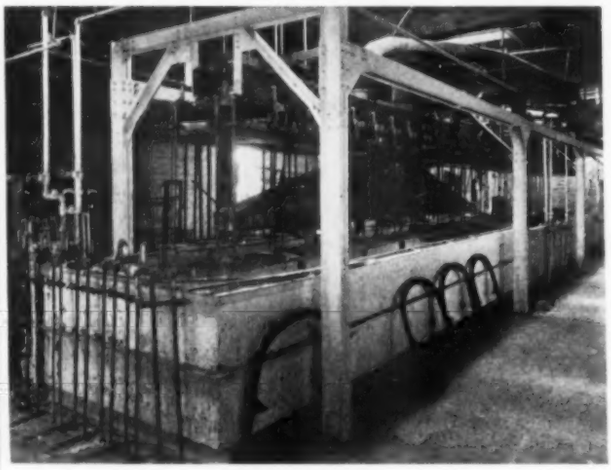

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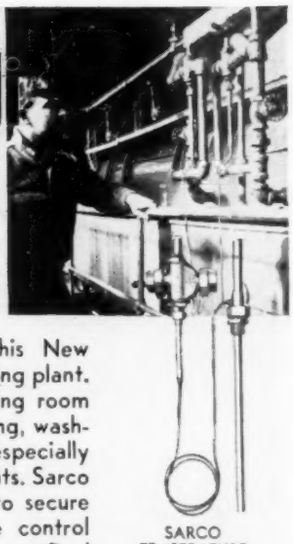

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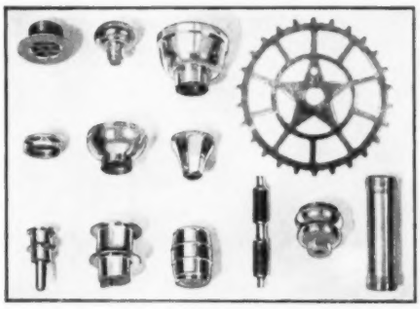

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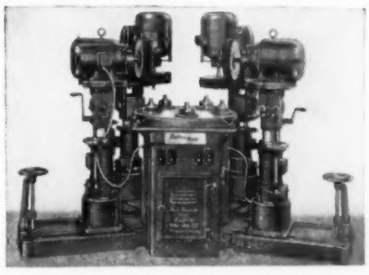

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